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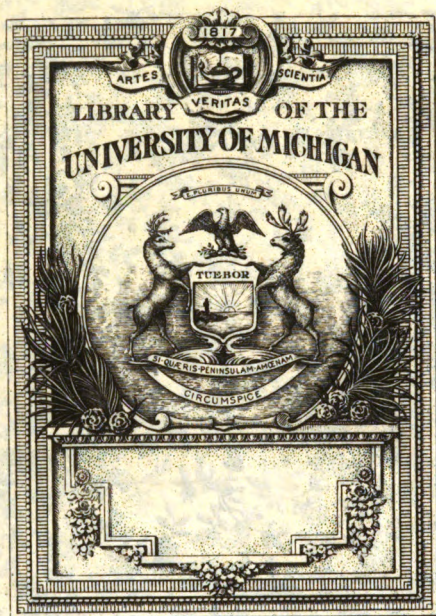
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*Annals of horticulture
in North America*
Liberty Hyde Bailey



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Annals of Horticulture

IN NORTH AMERICA

FOR THE YEAR 1890

A WITNESS OF PASSING EVENTS AND A
RECORD OF PROGRESS

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INTRODUCTION.

I SUPPOSE that all horticulturists are agreed that an annual of yearly progress in horticulture is a desideratum ; and yet there is no unanimity as to the plan or scope of such a work. It must necessarily include a record of the new plants of the year, and some reference to current books and bulletins may be expected, together, perhaps, with directories of societies and other horticultural institutions. But beyond these matters, perhaps no two horticulturists would agree. It is, therefore, peculiarly difficult to prepare a yearly volume which shall satisfy its readers. The field which these volumes are designed to enter is an entirely new one, not only because of the broad survey which they attempt to make, but largely also, because they are made at the close of the year, rather than at its beginning. They make no effort to compile directories and trade-lists for the use of the year to come, but they aim to glean the most important facts and movements of each closing year, and to bind them up compactly into a single sheaf. In a country so large and an industry so varied, it is impossible to gather all which is worthy of record in a compendium of horticultural progress ; but I hope that there is enough in the following pages to enable the sympathetic reader to arrive at some measure of the broader activities of the year.

It has been the desire to place in each volume the result of some unique investigation which should represent the status of a particular branch of American horticulture. In the volume for 1889, the Catalogue of American Kitchen Garden Vegetables occupied this place, and constituted the kernel of the book. It was expected that the present volume should contain a complete annotated census of all native North American plants and their horticultural varieties, which have been introduced into cultivation, and reference is made to it upon page 35. But it is so difficult to collect data upon which to elaborate such a census, and the botany of our cultivated plants is so little understood, that it was thought best to postpone the list; and the size to which the volume has grown has also justified the omission.

L. H. BAILEY.

GARDEN HOME, ITHACA, N. Y.

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PART I.

GENERAL ANNALS.

§ 1. *FRUITS, VEGETABLES AND GENERAL INTERESTS.*

The year 1890 was marked in general by poor crops. The orchard interests in particular suffered greatly in nearly all regions east of the Rocky mountains. Several causes combined to produce this disaster. The distribution of rainfall was abnormal. In most of the eastern states the precipitation was largely in excess of normal amounts, especially during the blooming season, while in the upper Mississippi and Missouri valleys rainfall was so light that very severe droughts followed. The difficulties were aggravated by excessive rainfall in the east in 1889 and by insufficient rainfall in the Mississippi valley. The Pacific coast suffered from excessive precipitation during the winter of 1889-90, but the summer was dry, especially in the northern regions. The temperatures of the year were also abnormal. Throughout the region east of the Rocky mountains the winter of 1889-90 was remarkably mild, especially in its latter part, and trees bloomed much in advance of their usual time. Disastrous frosts followed in March and later, bringing ruin to the fruit buds in all the middle and southern states, and to many districts farther north. On the other hand, the winter upon the Pacific coast was unusually severe, and the spring was also below the average in temperature. Fruits in the east which escaped the disastrous spring frosts were attacked to an unusual extent by fungous troubles, which were no doubt augmented by the peculiar meteorological conditions.

The apple crop was almost a complete failure east of the

Mississippi, barring partial crops in Michigan and Wisconsin. As this loss followed a partial failure in 1889, it has proved a serious menace to apple culture. Missouri gave the best yield for 1890, it being not far from a half crop. Wisconsin, Michigan, Ontario and Nova Scotia produced probably less than a fourth crop, while New England, New York and the middle states produced almost none. Apples have been brought in from the west to supply the demands, even in New York state. The cause of the apple failure is not determined, although it is supposed that an unusual and early development of the apple-scab fungus was largely concerned in it, at least in New York.*

The extent of the apple crop is well illustrated by the exports. The exports have been only about half as great as last year and one-fourth as great as in 1888-9. The following statement, furnished by Otto G. Mayer & Co., New York, shows the movements of apples to February 14th, 1891, at which time the exportations had practically ceased:

Barrels of apples exported to Europe for week ending February 14, 1891.

	LIVERPOOL.	LONDON.	GLASGOW.	VARIOUS.	TOTAL.
From New York.	385	60	25	.....	470
Boston	333	.....	.....	.....	333
Portland	6,860	.....	.....	.....	6,860
This week	7,578	60	25	.....	7,663
Same week last year	11,061	12,317	415	.....	23,793
This season	197,422	57,357	68,040	2,043	324,862
Last season to date	378,504	87,061	111,439	31,267	608,271
Short.	181,082	29,704	43,399	29,224	283,409

The apple export trade began in 1845, when five barrels were shipped from Boston to Glasgow under the auspices of a Scotchman—Buchanan. It was about thirty years later that the enterprise began to attract general attention. Very heavy exportations were made in 1885-6, and the largest trade was reached in 1888-9. In the latter year the exports were 1,407,419 barrels from America, of which 942,400 barrels were from the United States. The export trade gives promise of affording our most profitable market for winter fruit.

*Bailey and Dudley. Bull. xix. Cornell Exp. Sta.

The apple crop in Europe was short in 1890. In England it was about one-fourth of a full crop, the poorest known in many years. France produced an average crop, while Belgium had a half crop and Holland even less. Denmark had scarcely any apples.

Tasmanian apples began to reach London the last of April or first of May, and prices ranged from \$10 to \$12 per barrel. These apples reach the market so late and the prices are necessarily so high, because of the distance over which they are transported, that they do not compete seriously with American fruit. But some of this fruit found a market in San Francisco in 1890, and it will undoubtedly be shipped to America in large quantities in the future; and there are so many features of the Tasmanian apple industry which are interesting and suggestive to our growers, that I have invited John L. Conacher, of Tasmania, to prepare the following paper for this occasion:

“Although the apple industry of Tasmania may be considered as only in its infancy, I venture to express the conviction that within the next few years, stimulated by the profitable returns from the almost unlimited inter-colonial, European and American markets, it will become one of the staple industries of the colony, and fully realize the recent prediction of the *Fruit Farm Review* in becoming a ‘gigantic concern.’ That the orchardists of Tasmania enjoy to a pre-eminent degree every element necessary to the perfect production of the apple has been fully and practically demonstrated by the magnificent results obtained in the high yield per acre, combined with a quality which the great English expert, Sampson Morgan, described as of a very high standard, and which Dr. Hogg, the English pomologist, declares (even after the unavoidably deteriorating circumstances consequent upon a journey of fourteen thousand miles) as equal to English hot-house fruit.

“The climate and soils of Tasmania are very variable, from the damp but rich forest lands of the west to the dry open plains of the east and the high elevated table-land of the midlands. The best fruit districts are the valleys of the rivers Huon and Derwent in the south—the former being considered the ‘Kent of Tasmania;’ although, owing to the drier climate of the Derwent valley, some experts consider the fruit raised

in it better adapted for long transit. The soils most in favor are friable surface (loam or dark sand) and clay sub-soil, or decomposed rock and basaltic or tertiary formation. Great care is necessary in selecting the particular site of the orchard—shelter from winds and comparative freedom from spring frosts, combined with clay sub-soil, being imperative requisites, the latter to afford the necessary moisture to the tree roots during our dry summers.

“Most of our varieties are imported from England, America and France, but some few are from Tasmanian seedlings. Some time ago the Fruit Growers’ Association of this colony offered a prize for a paper on best apple trees to plant, and after careful consideration they awarded first position to Dr. Benjafield’s essay, who thus writes: ‘To find out what fruit trees are best to plant, we must first know what markets we have to supply with the fruit when grown. And we may speak of them as four markets: (1) The home market in Hobart and Launceston; (2) New Zealand, with its seasons even later; (3) the Melbourne, Sydney and other colonial markets, which require late keeping fruits chiefly; and (4) the London market, requiring good keeping and carrying fruits, but fruit that will gather early. The character and appearance of fruit, too, must be taken into account. Salesmen, all the world over, tell us they must have large fruit and well colored. If with this we can obtain quality as well, we have then reached what the market requires. But the grower must consider the character of the tree he is planting—is it a strong grower? will it bear well? is it a good bearer every year, or only alternate years? and so on. I shall try to remember all these in the sorts now to be given, best six dessert and three kitchen apples, and proportion of each in the 1,000.

DESSERT.

Cox’s Orange Pippin	400
Sturmer Pippin.....	140
Adams’ Pearmain.....	100
Ribston’s, or King of Pippins.....	50
New York.....	50
Emperor Alexander	10

COOKING.

French Crab	100
Wellington’s	100
Prince Bismarck.....	50

 1,000

"The distance at which trees are planted is an ever variable one. Orchards situate near centers of population are planted at 12 to 17 feet apart, but in the more rural districts a greater width is given, principally to allow tillage by horse power, in which case root crops are grown between. The style of tree most in favor, and which is almost universally adopted, is what is termed the dwarf, with short stem and twelve to fourteen cordon branches. The principal advantages in this system are (1) ease of pruning, (2) fruit is better protected from wind, and (3) fruit can be gathered with greater care.

"When trees come into bearing, and how long they bear profitably are difficult questions to answer. It would be almost impossible to lay down any hard and fast rule on either of these points, so much depends upon the variety of tree, situation and soil of orchard. Generally speaking, taking the assortment as given above, the average yield obtainable per acre in fifth year after planting is fifty bushels, and about 100 bushels in the succeeding (or sixth) year, gradually increasing to tenth year, from which latter date to twenty-fifth the tree may be said to be in its prime or best bearing period. As regards the age at which our trees cease to bear profitably, this question cannot, as yet, be answered from experience. In twenty-five to thirty years a general decline is noticeable, gradually decreasing thereafter, although several instances have come under my notice where trees are bearing profitable crops in their fiftieth or sixtieth years.

"Fruit gathering begins for the earlier varieties at the end of February, but many crops are not ready for picking till end of March and month of April. The careful handling of fruit is one of the most vital essentials to the realization of successful apple farming. Hitherto growers have not sufficiently realized the imperative necessity of having each individual apple carefully picked and placed in a lined basket or case before removal to store or packing room. At present the fruit is gathered and placed in cases—in some instances packed in orchard—conveyed to receiving house, and there packed for shipment.

"No point in fruit industry has received more attention than that of exportation, so far as having matters publicly discussed in the press and at various meetings of the growers is

concerned. At present no definite rearrangement of the past methods has been agreed upon. Owing to the many risks to which the fruit is subject in the cool chambers of the ocean steamers by either having temperature too high or *vice versa*, and the perishable nature of the apple, the various shipping companies insist upon freight being prepaid, and this, in many instances, is a barrier the producer has found it difficult to surmount. Commercial houses of standing have stepped in, and, under guarantee to shipping companies, chartered a given proportion of cool chambers some time in advance of the fruit which they undertake to ship, pay freight and other incidental initial expenses, transmit the various consignments to any sales agent the grower may prefer, and in due course forward the original account sale with proceeds, less shipping charge and initial expenses disbursed.

"In treating of average yield per acre and profit of fruit-farming, we venture on the solution of a very difficult problem. W. E. Shoobridge, of Glenora, who may be considered as the leading orchardist of Tasmania, in reply to our query on this matter, says 'average yield per acre depends greatly on situation, care and cultivation, good orchards yielding an average of 100 to 200 bushels, and in some instances 300 to 400 bushels, according to season.' Dr. Benjafield, on the other hand, in reply, gave the following as the actual result of an orchard of ten acres: '4,600, 3,600, 3,600 bushels for tenth, eleventh and twelfth years respectively, or an average yield of 393.3 bushels per acre. Outside yields of 600 to 1,000 bushels per acre have been obtained.' When considering this question and the profit, it must be borne in mind that the fruit producer has, like his brother, the agriculturist, many troubles to contend with. In the first place, labor is expensive and scarce at time when most wanted, in addition to which there is the contingency of excessive spring frosts, high winds and the apple pests, principally the codlin moth and oyster scale. I should also hesitate in giving any definite decision in matter of profit, as this can only be done with any degree of accuracy by taking the average of older established industries than that of fruit culture in Tasmania.

"In treating of the average prices realized in the various markets, we may class our home and inter-colonial sales under one head. In this, the prices ruling for season just ending

have been most unsatisfactory to the sellers. In the beginning of the year, a second line of steamers was inaugurated between Hobart and Sydney, reducing freight generally 50 per cent., but owing to irregular sailing dates, the result has, as was anticipated by many, proved disastrous to the orchardist. The fruit was placed in shipments of ten to thirty thousand bushels per steamer, with sometimes only one and two days interval, on the New South Wales markets, the results being as aforesaid. Fruit merchants and others were unable to judge when a second steamer would arrive with a heavy shipment, thereby reducing the value of fruit purchased by 40 per cent. to 75 per cent. Briefly, the average net return to the producer for last five years for sales in Tasmania and adjacent colonies may be put three shillings six pence to four shillings per bushel at the orchard. During the past season, we have opened a new market for the sale of our apples in San Francisco, with most satisfactory results and every encouragement to materially increase our annual consignment thereto. Prices ranged, according to quality and packing, from two to four dollars per bushel, with an average of about \$3.

"In dealing with results obtained in London, I shall consider it as the center of European markets. As far back as 1870 small test shipments of fruit were consigned as ordinary cargo, the result being, as a rule, unsatisfactory. Five years ago the matter was inquired into and arrangements made with the shipping companies for conveyance of fruit in the cool or refrigerated chambers of the ocean steamers, since which date our shipments annually have materially increased. For the ensuing season arrangements are in course of completion for the consignment of probably about one hundred thousand bushels of apples to be placed on London markets. Complete returns for past season's sales are not yet to hand—account sales for last two shipments being still wanting. The average realized for shipments by four steamers is

Ribston Pippins.....	19 s.	1 d.	per case of say 43 lbs.
King of Pippins	15 s.	10 d.	" " "
New York Pippin.....	15 s.	6 d.	" " "
Cox's Orange Pippin.....	15 s.	5 d.	" " "
Sturmer Pippins.....	14 s.	11 d.	" " "

"The foregoing averages may be considered as conclusive of the quality of Tasmanian apples, and as fully bearing out the

opinions expressed by the English pomological experts quoted in my opening remarks. I may also add that our last shipment this season was placed on the market at the same time as consignments from Nova Scotia, the latter averaging according to catalogue returns 15 s. to 17 s. 6 d. per three bushel barrel, whereas Tasmanian one bushel case realized about 15 s. each all round. Against the foregoing high averages we regret to add that this season's experience again emphasizes the risk to which our fruit is subject in the cool or refrigerated chambers during transit.

"To maintain the high averages in the European market obtained in past two years, experience demands that only prime quality of fruit should be shipped. Orchardists, instead of allowing the tree to prematurely exhaust its resources, and spend its energy and vitality in producing the necessary greater number of 'pips' consequent upon growing large and small apples, must give greater attention to growing the maximum number of saleable apples which can be included in the 'graded' requirement of our English market. By this means the heavy freight expenses are reduced, the strength of the tree is conserved, fruit of a finer quality produced, and instead of having heavy crops every alternate year, a nearer approach to continuous annual yield is obtained. Other vital elements are the picking and wrapping of each individual apple in good impervious tissue paper. The past year's experience has conclusively proved that finest 'wrapped' realizes shillings more per case than unwrapped. Economically it pays the fruit producer so to do. A given quantity of apples wrapped will fill eleven per cent. more cases than unwrapped, the surplus increase defraying extra initial expenses incurred in labor and paper.

"Tasmania may be considered as the best country in the world for the production of pears, peaches, apricots and small fruit. The pear has received special attention, some growers having a very fine collection of best European varieties. The apricot and peach are now being largely grown. It may particularly interest many of my readers to know that young peach trees have been shipped from here this year to the Delaware Experiment Station for experimental purposes, with the view of growing trees from this new stock that shall resist the fatal 'yellows.' Plums of every description are exten-

sively cultivated and produce prolific crops, while currants and strawberries far surpass their namesakes in England, both in quality and fertility."

Other orchard fruits gave very poor yields throughout the north. *Peaches* failed more completely than ever before perhaps. In New Jersey, Delaware and southward the failure was due to frosts which followed warm weather, and the same was true of the peach region of Michigan and Southern Illinois. In some parts of the country, particularly in New York, the trees set fruit, but it was destroyed by severe attacks of curl leaf (*Taphrina deformans*) upon the leaves. The yellows is making rapid headway in the orchards of the Chesapeake peninsula and is lessening the peach area. *Peaches* were probably never more scarce than in 1890. *Pears* were nearly everywhere much below the average in quantity and quality. The pear scab and cracking of the fruit were prevalent and serious. The Le Conte pear yielded well in some parts of Georgia, however, notwithstanding the March freeze, and high prices were realized. *Plums* and *cherries* have yielded fair crops in some localities. *Quinces* were fair to poor. The *nut crop*, mostly derived from wild trees, was also small.

Orchard fruits were below the average in Europe as a rule, and the plum crop in England was one of the smallest for many years. The French prune crop is reported as large. The Smyrna fig crop is said to be below the average.

Oranges were a fair crop in Florida. About 2,000,000 boxes were secured, against 2,150,000 in 1889. The March freeze did much damage, probably lessening the crop by one-third, but the young orchards and the second crop of flowers held up the yield. Prices are good. The export trade in Florida oranges, which began in 1886, is now assuming considerable importance. The yield in California is probably the best ever secured. Mexican oranges have reached American markets in some quantity this year, and there is reason to expect that serious competition will soon arise from that source. Mr. Temple's account of fruit possibilities in Mexico, on a following page, are instructive in this connection. Bonavia* predicts that the citrus fruits of India will lessen the demand for the Florida product in foreign markets. "Orange growers in India and Ceylon, with their command of cheap labor, might,

*Oranges and Lemons of India and Ceylon, xi (1890).

I think, advantageously compete in the London markets with the growers of Florida and their dear labor. An English or American laborer is paid 5s. 3d. per day, and skilled gardeners get higher wages; that is, about ten times the wages of an Indian *mali*. * * * It should be remembered that a sufficiently good orange grower, if he has the right soil, requires very little knowledge beyond that necessary for raising seedlings, budding them, and manuring and watering the trees at the proper times, all which he might learn in a month. If garden labor in India is ten times cheaper than that of Florida, it would require that the carriage from Florida to London should be ten times cheaper than that from Bombay and Karachi to London, to enable the former to compete on equal terms with the latter. It will be seen, moreover, that in Florida, frosts are occasionally so severe as to turn all the orange crop into ice-balls and ruin it, besides killing all the young stock in the nurseries, if it does not also injure the adult trees. There is, perhaps, no part of India where oranges are grown extensively, which is subject to destructive frost, such as that which is said to have occurred in Florida in 1885-6."

Grapes were a heavy crop in the great vineyard regions of New York and Ohio, but were below the average in New Jersey and Delaware. The fungous diseases were very prevalent throughout and in most regions the copper salts had to be employed to save the crop. The raisin and grape crops of California were large, and there was a sufficient raisin crop in Arizona to attract the attention of fruit growers. The foreign raisin crop, especially in the far east, is said to have been lessened by bad weather and by the depredations of phylloxera. The Smyrna raisin crop is reported as one-fourth short of last year. Malagas were a good crop, but copper salts were largely used upon them.

Small fruits nearly everywhere gave large yields, although there was some complaint from various fungous diseases. The returns on the average were fair, although they were very low from the crop of Southern Illinois, particularly strawberries, owing to the immense crop and the soft condition of the fruit. The blackberry and raspberry yield in New Jersey and Delaware was estimated at about a half crop.

The Cranberry crop of the country for 1890 was good, standing in round numbers, about as follows :

New England	375,000 bushels
New Jersey	150,000 "
Wisconsin	275,000 "
Total	800,000 "

Prices opened higher than usual and the market continued to improve until January 1st, when there was a slight reaction which continued for about six weeks. Since then there has been improvement. The prices were on the whole steady, and although not high were very satisfactory. Oregon and Washington are beginning to attract some attention as cranberry states.

Vegetables of all kinds yielded well. The year was a profitable one for the truckers about Norfolk. The *potato crop* was light and poor, probably no more than half an average crop. Rot was very serious in many regions. The statistician of the Department of Agriculture reports as follows upon the crop : "The potato crop suffered from unfavorable weather at time of planting and at time of harvest. This was especially true in New England and the Ohio Valley ; condition throughout the season was low, and the returns of yield per acre were in close harmony with the season's record. The estimated yield per acre is only $57\frac{1}{2}$ bushels, which, with two exceptions, is the lowest yield ever reported. The same conditions which injured the crop during the early growing season resulted in making the area smaller than was originally intended. The actual supply for consumption per head of population of this important food crop is smaller than in any recent year." The crop in Manitoba was large enough to afford some for importation into the United States. The crop was a failure in Ireland and great distress has resulted. In other parts of Europe it appears to have been fair or good.

The *melon crop* of the South is yearly becoming more important, and the area devoted to watermelons in Georgia alone for 1890 has been estimated at nearly 30,000 acres.

The *tomato pack* was somewhat above the average of the last three years. For the Union it was 3,166,177 cases, as compared with 2,976,765 cases in 1889. Maryland, New Jersey and Delaware gave heavy yields, while the pack in other states was comparatively light.

California. In general, the fruit crop of California was the

largest ever produced, and the scarcity of fruit in the east caused prices to run high. The last year has witnessed a widespread interest in California fruit throughout the country. The present condition and prospects of California horticulture are discussed for this occasion by Charles Howard Shinn, Inspector of the California Experiment Stations: "The growth of the horticultural industries of the State of California has attracted much attention, but chiefly in a fragmentary and unfinished way. The field is so large that this is perhaps impossible to avoid at present. Statistical science is not well maintained by the government of California, and horticulture has been especially neglected in this regard. Some counties make admirable reports of the orchards and of similar industries; others furnish little or nothing that can be depended upon. The nurserymen give no statistics worth the name, and the growers of ornamental plants, cut-flowers and vegetables are not much better. Briefly, then, one must depend upon personal observation for a general review of the progress of California horticulture from year to year and decade to decade.

"A few of the larger statistics that may be accepted as accurate are as follows: The area of wine and raisin grape lands is 225,000 acres; the wine product of 1890 was 18,200,000 gallons of wine, and 9,000,000 lbs. of dried wine grapes. The raisin crop was 40,000,000 pounds; the prune crop was 15,000,000 pounds. The amount of green fruit shipped out of the state was 105,000,000 pounds, or about twenty times the shipments of 1880. The shipments of dried fruits, other than prunes, was 66,318,000 pounds, or about one hundred and twenty times the shipments of ten years ago. The orange shipments now beginning to be sent away will be about 4,000 car loads. The value of the cereal, hay and root crops for 1890 was about \$75,000,000. The population of the state has only increased fifty per cent. since 1880, and is now about 1,250,000, but new industries have been created, and the old ones have been developed with a rapidity that is one of the surprises of American agriculture. The total value of all the products of the state in 1890 was more than \$303,000,000.

"The fruit crop of California for 1890 shows, in the various counties of the state, an increase of from twenty to one hundred per cent. over the crop of 1889. At the beginning of the season a short crop was expected by the fruit growers,

owing to the late frosts in some districts, and rains during the blossoming time. The leading canners became convinced that this was a mistake, and so they contracted in many cases to deliver enormous quantities of fruit at a low price. When the situation was understood—a failure of the eastern peach crop, and a great demand for all kinds of California fruit—the canners hastened to secure contracts with the growers before prices went up. They failed in most cases, and the unprecedented profits made in 1890 in California fruit were made by the speculators who bought ‘long’ on canned goods, and by the actual growers of the fruits. One result of this state of affairs will probably be a ‘close combination’ of all the California canneries.

“The profits of fruit growers have been in many cases so great as to pay for the land three times over. The local newspapers of the state are crowded with well authenticated illustrations of the possibilities of California fruit growing. I will give a few of these which I have myself investigated and can vouch for as in every respect reliable :

“The Oak Shade Fruit Company, of Davisville, shipped seventy-five car loads of Bartlett pears to eastern markets, and their entire fruit crop was 150 cars. This includes almonds, raisins, prunes, etc. The profit from these was a total of \$30,000 from 360 acres, or eight per cent. on an investment reckoned at \$1,000 per acre. Ernest Dewey, of Pomona, reports as follows : ‘Golden cling peaches, 10 acres, seven years old, produced forty-seven tons green, sold dried for \$4,800 ; cost of production, \$243.70 ; net profit, \$4,556.30. Soil, sandy loam, not irrigated.’ E. P. Naylor, of Los Angeles, says : ‘Fifteen acres of six year old prunes produced 149 tons ; sold for \$7,450 ; cost of production, \$527 ; net profit, \$6,923. Soil, loam with some sand, irrigated one inch per ten acres.’ The dried prunes from ninety-seven trees on W. A. Gibson’s place near Calistoga, sold for \$537. The number of trees above mentioned is a little less than prune-growers set on an acre of ground. W. M. Baker, manager of the Colfax Mountain Fruit Company, says that he has peach trees two years old on his place at Landor, Nevada County, many of which yielded \$1 per tree and some \$5 per tree. A Woodland grower says : ‘I would rather cultivate prunes than anything that grows. In 1889 I dried 15,000 pounds of prunes, my own and what I

bought on the tree. I got 6,300 pounds of the dried article which I sold for six cents. My four year old prune trees yielded me from 200 to 250 pounds to the tree of large and beautiful fruit. Counting seventy-five trees to the acre, this average would net about $8\frac{1}{2}$ tons to the acre, worth about \$350.' James McPherson, of Oroville, cleared \$100 per acre on his Bartlett pear orchard in its first year of bearing. A four year old peach orchard in the same district yielded \$150 per acre above expenses. The Paige & Morton fruit farm in Tulare County reports as follows: 'In this orchard there are in bearing, the trees being four to five years old, 25 acres of apricots, 119 acres of peaches, nearly 19 acres of pears and $7\frac{1}{2}$ acres of prunes. The fruit from these trees aggregated, weighed green as it came from the orchard, 3,047,754 pounds. Sixty car loads were sold green to California canneries, or shipped to New York, Chicago, Minneapolis or Boston. Ninety car loads of green fruit were dried, making fifteen cars of dried fruit, averaging 20,000 pounds to the car. The apricots paid this year per acre, net, \$211.70; nectarines, \$276; peaches, \$350; prunes, \$600; pears, \$427. The total receipts from the orchard, exclusive of vineyard, were nearly \$90,000.'

"One could easily obtain higher figures than any of these. One prune grower cleared \$650 per acre on his orchard. But it does not seem wise to use many such illustrations. The 'general average' is better. In Riverside, for instance, where about 543,000 orange trees are planted, the average annual yield is \$400 per acre. The average profits in all the old and established deciduous fruit districts are so great as to lead to the conclusion that one acre of good land in fruit paid in 1890 about as well as 26 acres in wheat. Ten acres in peaches or apricots, pears, plums, prunes, or any other deciduous fruits are therefore more valuable than 250 acres in grain.

"The census returns show that all the counties of California that have urged forward horticultural developments have greatly grown in population and wealth, while those that continue to depend upon sheep-raising and wheat-farming have remained at a standstill for a decade and more.

"'Irrigation and sub-division' is now the motto of the progressive Californian. During the last year a very large number of new irrigation districts have been established, and many old ones have been enlarged. Not less than 250,000

acres will be brought under water before the close of 1891; possibly nearly a million acres may be reclaimed in this manner before 1892. Only about 2,500,000 acres of land are cultivated in the whole state, while 33,000,000 acres are arable, and 20,000,000 acres of wild mountain territory are covered with forests. The vast increase in the number of irrigation schemes has led to much activity in the way of new colonies. Every possible method of organizing and establishing colonies is illustrated in California. All sorts of co-operation are being tested. There are colonies where the entire planting is carried on by a board of directors elected by the colonists; there are others where each man pays a given sum monthly, and at the end of a fixed term receives his land in a high state of cultivation. A book is yet to be written upon the details of colony management, and the general conditions of life in these colonies, which are for varied purposes—wine making, raisin growing, olive culture, the orange industry, and dozens of other enterprises. Women are combining to grow flowers for San Francisco markets, and vegetables to ship east. Every month in the year a number of new colony schemes are offered to purchasers, and the greater number of them promise to be successful.

"As I have already said, the statistics of tree-planting are deficient. Some counties, however, have made admirable reports. Such famous districts as Napa, Sonoma, Santa Clara, Solano and Alameda—districts that will probably always lead the rest of the state in deciduous fruits, and in table wines—are districts that make but poor and badly classified statistical reports. A very satisfactory statement from Los Angeles county may serve to illustrate the extent of the present growing industries in the state. Fully twenty out of the fifty counties of California make great showings in these fields.

LOS ANGELES HORTICULTURAL STATISTICS.

ORANGE TREES.

Seedlings, 10 years and over	259,038
Seedlings, under 10 and over 5 years	24,378
Seedlings, 5 years and under	20,261
Budded, 10 years and over	68,611
Budded, under 10 and over 5 years	123,689
Budded, 5 years and under	491,115
Seedlings in nursery	1,042,315
Budded, in nursery	788,409
In seed bed	4,446,600

LEMON TREES.

In bearing	37,106
Not in bearing	29,524

OLIVE TREES.

Number of olive trees	170,654
In nursery	336,594

DECIDUOUS TREES.

Number of acres of deciduous trees	12,629
Number deciduous trees in nursery	287,075
Walnut trees	110,626
Walnut trees in nursery	12,900

TOTALS.

Orchard trees, citrus	1,336,002
Orchard trees, deciduous	1,515,480
Nursery trees, citrus and deciduous	3,067,293
In seed bed, citrus	4,446,600
Total	<u>10,365,375</u>

"In this connection I may add that, since the above report was made, a San Fernando firm has arranged to plant out 30,000 walnut trees. Ventura and Santa Barbara are also becoming great walnut districts.

"Butte is one of the most prosperous of the Sacramento Valley counties. The assessor's report of that county gives 394,867 fruit trees planted in orchards. But the Oroville orchardists claim that a private census made by a committee gives them over 500,000 trees. At Chico, Gen. Bidwell has about 100,000 trees, and the rest of the county would carry the total to nearly a million. About 60,000 olive trees and 100,000 oranges are planted chiefly in colonies. If complete statistics were secured from Butte, the district would rank as one of the first in the state. A great deal of land has been bought there for planting this season or next.

"The State Horticultural Commission has compiled much valuable statistical material, and its report on the Fresno district may serve to show the nature of the development going on in the San Joaquin counties. I quote from the *Expositor's* editorial:

"There are 1,600 vineyardists in this county, the total acreage of grapes is 49,068, the acreage in bearing is 22,280, and the acreage in wine-grapes 5,908. The increase in the

acreage during the season of 1889-90 has been particularly heavy, the planting to vines of tracts of from 250 to 1,000 acres being quite a frequent occurrence.'

"What is especially interesting to the home-seeker in connection with this information is the fact that every one of these vineyardists is prosperous. No other horticultural industry is so profitable as the culture of the raisin grape; in no other is the work so pleasant; and no other yields a return so quickly.

"An acre of Muscat vines in full bearing will yield from two to three tons of grapes, on good heavy soil; at 5½ cents a pound in the sweatbox, this means from \$225 to \$325 per acre, gross. Numerous instances are known, however, where the yield of an acre of Muscats amounted to as much as \$450, this being the result of careful cultivation and favorable circumstances. Some grapes are borne on the vines when they are one-year old, while two-year olds have been known to bear a crop. At three years the vines pay the expenses and interest on the money invested, and at four years from planting they bring the first large paying crop.

"An acre of wine grapes will yield from seven to nine tons. These may be sold either wet or dried. The former will sell at about \$12 a ton, or from \$85 to \$100 for the yield of an acre. Dried, the yield will shrink to from one and a-half to two tons, which will bring \$60 a ton. These figures are for land that is of fair quality and which has received intelligent cultivation. Some vineyards yield less and others more, so the figures given are a fair average.

"Multiplying the yield of an acre of grapes by the total number of acres in bearing, the value of its vineyards to Fresno county at once becomes apparent. There is a difficulty, however, in striking an average for an acre of grapes for the purpose of making this calculation, for the bearing vines are of all ages and the difference in soil and methods of cultivation also cut an important figure. Of the 28,000 acres in bearing, the vines on about 20,000 must have attained their full growth by this time. A very moderate estimate of the amount of money to be gained from an acre of grapes is \$200. This would bring the total for the 20,000 acres to \$4,000,000.

"In about four years more the total acreage now in grapes, 49,086, will be in full bearing; multiplying this by \$200, the

value of an acre, the immense total of \$9,817,200 is reached for the entire grape crop of 1894 off the vines now planted.

"Of the 5,600,000 acres of land comprising this county (Fresno) at least a fourth may be classed as agricultural land. Owing to the absence of water in sufficient quantities, however, only one-third of this amount, or about 400,000 acres, is suitable for the culture of the grape. But these 400,000 are here awaiting the coming of the enterprising capitalist and the industrious home seeker.

"The California horticulturist finds it hard to procure laborers. The case was well stated by Mr. W. H. Mills, in his State Fair address. He says: 'The vineyard owned by Senator Stanford is the largest in the world. It covers 3,900 acres of bearing vines. It is operated under a single control, and is the largest operation of its kind known. The statistical facts relating to it would be the equivalent of statistical facts relating to thirty-nine vineyards of 100 acres each, and the facts are as follows: Exclusive of any labor employed in planting or grafting old vines, the operations of the vineyard require the labor of 135 men for six months; that is the maximum requirement of the period of cultivation; then comes the vintage. This requires the steady employment of 500 men every part of two months, but for three weeks of that period the demand will be for 700 men. For steady annual employment, but 70 men are required. Here we have a minimum of annual employment equal to 70 men, for the period of cultivation 135 men, and a maximum during the vintage of 700 men. The maximum is ten times the minimum in this case. There are about 200,000 acres of bearing vineyard in this state. Carrying the proportions derived from an exhibit of the great vineyard into the entire vineyards of the state, and the 200,000 acres of vineyard in this state would give us annual employment for 3,500 men. It will at once be seen that, if grape-growing was the sole industry of the state, the 3,500 men who would find in it steady employment would be the only available labor for the vintage, and they would be grossly inadequate. As has already been shown, the vintage requires ten times as many men as the industry affords annual employment. It would be impossible to have the labor of nine men available for a few months in the vintage season for one man who might find steady employ-

ment. The value of a diversified industry comes into view, and with the accession of population, industries become more diversified.'

"In the leading fruit districts whole families 'camp out' and gather fruit by contract. Japanese laborers are increasing in numbers. Hundreds of girls and women are employed in the canneries. At Fresno they are paid \$1.75 a day. It is certain, however, that there will be a scarcity of labor in a few years more unless an unexpected increase in immigration takes place. The lack of labor is the only doubtful feature about the future of fruit growing. Many of the fruit growers, it may be said, employ Chinese, and wish that they could obtain more.

"One of the coming industries of the state is the growing of winter vegetables for the eastern markets. The bean crop of 1890 was 1,000,000 centals, but many farmers think that the crop of winter cabbages, onions, potatoes, peas and similar products will be more important in a few years than even the Lima bean fields of Ventura.

"A letter to the *Salinas Index* says: 'The enormous quantity of potatoes per acre raised on the Buena Vista Ranch this year is almost incredible. Several of the parties who bought land there a little over a year ago, paying \$100 per acre, have raised this year upon the same upward of 200 sacks per acre, and some as high as 300 sacks, and have sold them on the ground at \$1 to \$1.25 per sack.' The winter fairs for citrus fruits which have been held in Los Angeles, Riverside, Pasadena, Oroville, Marysville, Sacramento and other cities of northern and southern California are not less notable for their winter vegetables and small fruits than for their oranges. Beans, peas, red peppers, melons, tomatoes are exhibited at these fairs as gathered from the open ground in January.

"A letter from Los Angeles in reference to winter cabbages says: 'A good time to sow the seed is the latter part of September or the first part of October. A person should be governed by the time the land will be in condition to set the plants, as regarding the time of planting the seed. The plants should be from four to six inches high when transplanted, and allowed to grow from five to seven weeks from the seed. To get the very best results in raising plants, the

seed should be put in with a seed drill in rows from eight to ten inches apart and not too thick. This year the cabbages were cut so as to leave three or four of the bottom leaves to keep the heads from bruising in the car, the cabbage being in much better condition at destination than to have the head stripped bare as formerly. The yield per acre in this part of the country is from five to ten tons. The average price per ton for the last four years has been from \$13 to \$14. The best land to grow this vegetable is heavy corn soil.

“The principal points to which cabbages have been shipped the past season from this part of the country are Denver, Ogden, Kansas City, and different points in Minnesota, Montana, Oregon, Washington and Texas. Denver has been by far the largest distributing point. Texas has also been a good customer. The freight on cabbages in car-load lots has been 90 cents per hundred pounds to Denver and Salt Lake City, 80 cents to Portland and \$1 to Chicago, St. Louis, Kansas City and St. Paul, and all points in Texas. The demand for cabbages can be pretty accurately figured in November by those who are posted in regard to the condition of the cabbage crop and the amount raised in the eastern states. The principal point that California has to compete with in raising fresh winter cabbages is Florida. Some years January and February shipments bring the best price, while other years April and May take the lead.’

“The horticultural meetings of 1890 showed increased attendance, a very gratifying degree of success in fighting insect pests, and a general advance in all that pertains to the various departments of the industry. The State Board of Horticulture was created by an act of 1883, and consists of nine members, appointed by the Governor. It appoints a salaried secretary, upon whom a great deal of work necessarily falls, an inspector of insect pests, clerks, etc. The total appropriation that it has for the fiscal year ending June 30th, 1891, is \$12,500. Twenty-one counties have boards of ‘county horticultural commissioners,’ each with a salaried secretary, and these boards meet in a yearly convention. B. M. LeLong, the Secretary of the State Board, reports that 1,128 volumes of horticultural books are in the library. The reports of the Board are considered very valuable abroad and at home. They are large and expensively illustrated volumes,

well edited and full of practical information upon the olive, orange, lemon, prune, fig, cherry and other fruits, besides horticultural machinery, California patents, and all the subjects that belong to the industry. The ten thousand copies printed of each report are almost immediately exhausted. Last year many schools wanted a copy for each pupil, but only one copy could be sent to each district.

"The University has charge of five experiment stations. Three of them are well established, one at Jackson, Amador County, for the Sierra foothill region, one at Folsom, for the alkali soils of the San Joaquin, and one at Paso Robles for the Coast Range. The central or home station at Berkeley hardly represents any typical climate. A new and very important station has now been commenced in the Chino Valley, about midway between Chino and Pomona, and this is to be chiefly a citrus and semi-tropic station. The Chino Valley lies mostly in San Bernardino county, and represents a happy medium between the coast and the interior climate. It is not as famous for oranges as the superb citrus colonies of Riverside and Redlands, farther inland, but it offers many advantages for experiment, and the planting of orchards and laying out of gardens has already commenced there.

"The work that the California experiment stations have to do is extremely varied. Not only fruits, but a great list of economic and medicinal plants are tested, soils are constantly analyzed, and the horticultural resources of the state are mapped out in the rough by thousands of observations and investigations, which must continue for many years before their full value is understood. A recent bulletin of Professor E. W. Hilgard illustrates the extent of the field. It was a study of 'the amounts removed from the soil by some of the chief fruit crops, of nitrogen, potash, phosphoric acid and lime, these being, according to all experience, the only ones of which the replacement need ordinarily be considered in fertilization.' These amounts, the report says, are expressed both with reference to 1,000 pounds of fresh fruit and to what, according to our best information, may be assumed to be a 'fair crop' per acre. The latter figure is, of course, liable to great variations and differences of opinion; but by the aid of a little arithmetic each one can calculate for himself the data suitable to his own case or views. The crop assumed in the case of

oranges is 325 boxes per acre of fifteen-year-old trees ; that of grapes is intended to represent a mean between upland and lowlands.

QUANTITIES OF SOIL INGREDIENTS WITHDRAWN BY VARIOUS FRUIT CROPS.

	Total ash. lbs.	Potash. lbs.	Phos. acid. lbs.	Nitrogen. lbs.
Grapes, 1,000 lbs.	8.8	5.0	1.52	1.70
Crop of 10,000 lbs. per acre.		50.0	15.20	17.00
Oranges, seedless, per 1,000 lbs.	6.07	2.78	.67	2.69
Crop of 20,000 lbs. per acre.		55.60	13.40	53.80
Pears, 1,000 lbs.	3.3	1.8	.5	.6
Crop of 20,000 lbs. per acre.		36.	10.	12.
Plums, 1,000 lbs.	2.9	1.72	44.	4.2
Crop of 30,000 lbs. per acre.		51.60	13.20	167.7
Apples, 1,000 lbs.	2.2	.80	.03	.6
Crop of 20,000 lbs. per acre.		16.00	6.00	12.0

"The drift of all experiments shows that lime and potash are usually abundant in California soils but that nitrogen and phosphoric acid are scarce. When the report alluded to was published, it aroused immediate discussion in newspapers, granges and horticultural meetings over the state. The need of the application of fertilizers was universally acknowledged. The University reports have gradually educated the public, and the 'scientific farmer' is not so rare a creature as he was a decade ago."

Washington. Attention has been directed of late to the remarkable horticultural resources of some parts of Oregon and Washington. It appears that the region lying about the Straits of Juan de Fuca, in the extreme northwestern corner of our territory, possesses adaptabilities to fruit-growing of an unusual character. The following correspondence upon fruit-growing upon Orcas Island, by Rev. S. R. S. Gray, which originally appeared in the *Seattle Post-Intelligencer*, indicates the possibilities of the region :

"The Japanese current exercises a profound influence upon western Washington, where, entering through the grand channels called the Straits of Juan de Fuca and the Gulf of Georgia, it penetrates by sounds, by canals, by reaches, natural harbors and vast bays, gulfs and channels far into the body of land lying west of the Cascade range and east of the Olympic range, so that thousands of square miles of agricultural lands are influenced. Lying in that vast waterway

where the waters of the Gulf of Georgia and the Straits of Juan de Fuca unite, in what is called the Archipelago de Haro, is an island which, not only favored by climate, has also great natural advantages for fruit and vegetable culture, surpassing any other part of western Washington. Situate partly in the cretaceous and partly in the lower silurian epochs, it has a soil rich in lime and phosphates, made in great part by the gradual erosion or decretion of the mountain slopes. Orcas island, named by the Spaniards, is the most favored of all the islands in the archipelago, or even of those lying outside to the west, east and south. Mountains rise on all sides, sheltering and warming by reflected heat the valleys and rolling lands between them. The sides of these mountains will some day be terraced and the grape be cultivated; and on higher slopes the peach and apple will find a soil and exposure which will produce the richest results. In every part of the island streams and natural springs abound—plentiful for irrigation of the whole of the 28,000 acres of bottom and valley lands. The soil, which varies from rich, black clay loams to red and brown sand loams, is everywhere underlaid at a depth of from eighteen inches to four feet with a good clay subsoil. The prune and the pear find their natural homes in the clay and heavy black loams, and the gravel and boulder lands produce those superb apples and peaches for which the island is famous. A well drained clay subsoil, other things being equal, will always produce finer results than any other kind. The richness of the soil above is never leached and wasted, as in those lands where the subsoil is of sand or gravel. Draining is very easily accomplished, as the lands are all rolling, and while so many ditches are not required, those that are properly put in do more and better work than where the land is level. Most of the draining has been done, so far, with cedar, or carefully constructed rock work, but tile will probably, in the near future, take the place of this rougher method. There has been a steady advancement in prices of lands for the past three years. Today uncleared ten and twenty-acre tracts bring anywhere from \$20 to \$100 per acre, according to location, and cleared and cultivated lands from \$60 to \$400 per acre, the higher prices being obtained in the village, at the head of East Sound.

“The fruits raised for market are apples, apricots, pears,

peaches, prunes, plums, strawberries, blackberries, and other small fruits. The principal vegetables raised are cauliflower, celery, cabbage, tomato, squash, pumpkin, and potato. Grapes of certain kinds, and canteloupe melons have also been successfully raised. Green corn is also a paying crop. It is a well-known fact amongst fruit-growers that the late varieties of apples pay much better than early ones, but many like to grow some early and fall varieties for market and they pay remarkably well at a net price of 75 cents per bushel. The Red Astrachan, which in some localities becomes a striped apple, is a good annual and early variety. But Williams' Early Favorite, a very dark crimson and juicy apple, is probably the best variety grown. Later the Gravenstein takes the first rank as an early fall variety. It is a fine golden apple with red stripes in the sun, very juicy, with a mild, subdued flavor, of a large or medium size. It brings 75 cents to \$1 a bushel, net. The Twenty-Ounce apple is the next variety of any great value. It is a large, boldly striped apple of second-rate qualities, but as it yields enormous crops every year it is much cultivated. About 3,000 boxes of this apple were shipped this year from East Sound alone, and brought an average price of 80 cents. The next varieties of any great value are Blue Pearmain, a large, purplish apple, with a fine bloom, aromatic, but generally of a second-class order; the Tompkins King, a large, brilliant scarlet apple of first quality, of which there was an enormous yield this year, bringing from \$1 to \$1.25 net, and those held to Christmas this year will probably bring nearly double; Canada Reinette, Blenheim (erroneously called the Dutch Mignonne), Fallawater, Paradise Winter Sweet, Ben Davis, Jersey Black, Rhode Island Greening, Gilpin (erroneously called Vandevere), Monstrous or Gloria Mundi, a fine cooking apple, Fall Pippin (erroneously called the Golden Ball), and the Yellow Belleflower, a fine and most profitable apple. After these come the longest keepers: the Lansingburg, a small green inferior apple, which yields heavily, and as it keeps till April, a very profitable variety; Peck's Pleasant, Monmouth, English Russet, Golden Russet, Ortley, a small medium sweet, green apple similar to the Lansingburg and locally called the Imperial, which yields heavily every year and keeps till April, and the Belmont, a good apple, but not as valuable as Monmouth or Peck's Pleasant.

Several other varieties are grown in smaller quantities and are doing well. Cole's Quince, an early variety, American Golden, and Grimes' Golden, are fall varieties and very valuable (the two last will probably be grown in great numbers); the Baldwin, Esopus Spitzenberg, Jonathan, Yellow Newtown, Fameuse, Maiden's Blush and Ribston, are also popular. Other varieties are being tried, such as the McIntosh Red, Romanite, Autumn Strawberry and Northern Spy. The best apple orchards on the island will yield this year about \$500 to the acre. An average income can be obtained of about \$300 in ten-year-old orchards. But this amount could be doubled and trebled if fruit-growers would follow Barry's advice, which is practiced all through Europe, of growing dwarf and semi-dwarf trees among the standards for the first twelve years.

"Pears are very profitable, but require a more thorough culture than has yet been given. And if this fruit were grown in pyramids, as well as standards, every acre would yield one hundred times as much as at present. The Bartlett, whilst not as large as the Bartlett of California, is much more luscious and more highly flavored. The Seckel, Onondaga, Gray Doyenne, Vicar, Anjou, Giffard, Flemish Beauty, Louise Bonne, and many other varieties are grown with great success, but perhaps the Bartlett and the winter pears pay best. They bring from \$2 to \$4 per bushel, and are sold in half bushel boxes.

"The prune industry gives promise of rivalling, if not of outstripping, the apple culture. The Fellenberg, commonly called Italian, gives promise of being the most valuable variety. The yield is simply enormous, averaging \$400 per acre in 7-year-old plantations. The German prune, which, on good black loam, also yields very largely and is a most valuable variety for drying, seems not to have grown into favor so far. The Prune d'Agen is left to California growers, being considered too small. The Silver prune in this locality is often confounded with Coe's Golden Drop, which it resembles only in color. The true Silver prune, the St. Catherine plum, is a very valuable variety and it is extensively grown in Belgium; It is smaller than Coe's Golden Drop, slightly larger than the Prune d'Agen, broad at the base, and upon turning the plum so that the suture is hidden, it is seen that the right

lobe is longer. There are about 10,000 acres suitable for prune and pear culture on the island.

"Cherries are an excellent and paying crop. But of the varieties grown, the Black Republican, the proper name of which is Llewellyn (an Oregon seedling), the Napoleon Bigarreau (erroneously called the Royal Arm), Murillo, Sparhawk, Governor Wood and the Bigarreau are the most valuable varieties. The Moorpark is the only apricot in bearing, but other varieties are being grown. This fruit, if well cultivated and severely pruned, will be one of the best paying fruits grown. Peaches are a proved success, the early and late Crawfords taking the lead. The Fidalgo, Waterloo, Troth's Early and Alexander all yield abundant crops. Strawberries are extensively grown, and do exceedingly well, yielding from \$500 to \$1,000 per acre. The principal varieties are the Sharpless, Crescent, Jucunda, Wilson and Manchester. Blackberries, of which fruit only the Lawton is grown, yield as high as \$800 per acre.

"There are about 28,000 acres of good fruit land on the island, without counting the mountain slopes which will be terraced and utilized also. Less than one twenty-eighth part of this is now in use. But the population is rapidly increasing, and one, five, ten and twenty acre tracts are being sold in every direction. During the past year over 1,000 acres have changed hands in tracts of various sizes in the village of East Sound alone, and over \$75,000 worth of fruit lands have been sold on the island. There is no reason why the island should not in years to come be as densely populated as the Island of Jersey, which is rather smaller in area than Orcas, but which by fruit and vegetable culture has built up a city of over 60,000 people, as well as an immense rural population."

Fruit culture in Mexico has been brought into prominent notice during the year through the discussions upon the tariff. Orange growers fear serious competition from this source. To determine somewhat of the extent of the fruit industry and possibilities in Mexico, I have invited A. V. Temple, of Guanajuato, who is well acquainted with the country, to express his opinions:

"The result of my experiences with American fruits in the state of Guanajuato is as follows:

"Apples, peaches, apricots, nectarines and cherries im-

ported from California do not do well, partly on account of there being no cold season to give the trees a rest, and partly because of the long dry season, succeeded by heavy, drenching rains. The trees grow in a sickly fashion for two or three years, and then become subject to various diseases and die. I have experimented with some five or six hundred trees of the above mentioned species, including some of the more prominent kinds, but uniformly with unsatisfactory results. The apricot trees are subject to a disease of the roots, which swell, and appear to be affected by some sort of fungus. The more vigorous the tree, the more it is subject to this disease. I now have under cultivation Bartlett and Seckel pears, and a few specimens of other varieties. They appear to be doing fairly well, and I judge they will be successful. Japanese persimmons also are doing quite well.

"I have under cultivation about 15,000 grape vines, mostly imported from California. These vines are doing well, in fact, quite as well as in California. The thicker-skinned and dark-fruited varieties appear to do the best, but as the fruit ripens mostly in the rainy season, we cannot count on a crop as surely as in California, for the hail storms and the periodical rains injure the fruit, and produce rot; but I think the crop will be as sure as the grape crop in New York, which is more or less subject to storms. The varieties known as Isabella, American, Concord, etc., do not do well in this country. They grow in a feeble, disheartened manner, and so far my own have produced no fruit.

"American horticulturists need fear no competition from American fruits grown in the central mesa of Mexico—that is to say, in the great plain from 4,000 to 6,000 feet above the sea. But the competition that American horticulturists will have to meet from this country is from the native fruits, which grow in great perfection. I mean the sub-tropical fruits, such as guavas, cherimoyas*, aguacates† and sweet limes. These are apparently subject to no special diseases, the trees grow vigorously, and the fruit ripens to perfection. The fruit is also better flavored than that grown on the coast, or in the immediate neighborhood of the sea.

"The one element that will prevent a rapid extension of

*Anona Cherimolia.

†Persea gratissima.

this industry is that all these trees are of very slow growth, requiring from eight to twelve years to come to full bearing, and as the number of trees now under cultivation is small, being confined to the local consumption, it will be many years before there will be any quantity of fruit for exportation. Fruit cultivation as an industry by itself is almost unknown in this country, the fruit trees being found mostly in the gardens connected with large haciendas, and I know of no fruit farm in the republic. The railroad communications with Texas and Kansas, and the exportation of coast oranges by rail through the central mesa is beginning to open the eyes of the hacendados to the importance of this branch of agriculture, and in a number of places trees are being set out, but as I stated before, it will be many years before they are in bearing. There are also a number of large vineyards, mostly of California varieties of grapes, being set out with a view to the manufacture of wine for home consumption. Mexico will never be able to export grapes to the United States in my opinion, but I think before many years the importation of grapes and wine from the States to Mexico will cease. The most serious competition from Mexico will come from the orange trade from the coast states.

"The haciendas with their orchards are entirely owned by Mexicans and Spaniards. The only American representatives of horticulture in this country that it has been my pleasure to meet, are the drummers for the nurseries, who travel through the country with their picture-books in hand, and specimens of fruit, but even they are not as well received nor doing as good a business as a few years since. Last season about 2,500,000 cuttings of California grapes were imported, and from Spain also quite a number. The California grapes have so far given better results here than those imported directly from Spain. American strawberries which I have experimented with do not do as well as the native berry, on account of the vines being more susceptible to drouth; the American berry is finer flavored and larger, but requires constant irrigation, whereas the native berry needs less water."

§ 2. ORNAMENTALS.

The ornamental gardening of the country is very rapidly undergoing a change, particularly in its application to home or private grounds. The formal and purely conventional features of ornamentation are giving place to the freer use of hardy perennials and native plants. Carpet bedding appears to have passed its zenith, or certainly to have reached it. The interest in native plants has never been so great as now; and it therefore appears to be an opportune time to compile some statistics of the cultivated plants of our flora, which I have attempted to do in a later part of this volume. Many of the so-called old-fashioned plants are coming again into favor, at least in their improved forms. All this indicates an evolution in taste which must be abiding.

The national flower discussion, which was so wide-spread during 1889, has greatly subsided. The California State Floral Society, at its December meeting, 1890, chose the *eschscholtzia* as the state flower, but beyond this no definite action has been taken by state organizations. The Superintendent of Public Instruction of New York obtained the votes of the school children of the state, with the following result: Golden-rod, 81,308 votes; rose, 79,666; ox-eye daisy, 33,603; violet, 31,176; pansy, 21,202; lily, 16,438; lily of the valley, 11,626; trailing arbutus, 7,888; buttercup, 6,127.

The interest in flowers is spreading rapidly, especially in the older portions of the country, and flower shows have never been so numerous and never more successful than during 1890. Exhibitions in the large cities are now patronized to such an extent as often to make even the most elaborate of them self-supporting. Several shows of unusual merit were held during the year. The most notable was that held under the auspices of the Massachusetts Horticultural Society upon the occasion of the meeting of the Society of American Florists. The practice of holding flower shows has extended to many small cities all over the land.

The Chrysanthemum appears to have received greater attention during the year than any other plant, both with professional florists and amateurs. No plant combines so many attractive qualities, as extreme variations in form, color and habit, and ease of cultivation and adaptability to exhibition purposes. Numbers of chrysanthemum exhibitions were held during the fall of 1890, and without exception, apparently, they were successful, and tended to still further popularize the flower. The following notes upon the chrysanthemum for 1890, have been made for me by B. M. Watson, Jr., of Harvard University:

"The chrysanthemum season just passed has been an interesting one. Never before have we had such an abundance of good bloom; the trade in cut-flowers has been satisfactory, and the attendance at the various shows has been greater than ever. While a large number of seedlings have been brought forward, and while they show good variety in form and color, we have no such additions to record as have marked the two preceding years; for instance, nothing has been shown which approaches the Neesima collection. It is noticeable that in many cases the still older sorts have held their own against the newer introductions. The production of seedlings is likely to continue, however, for some time. This is undoubtedly a most interesting feature of the cultivation to most growers, and we shall probably get improvements in different directions; but new sorts will be more critically examined by the gardener, and only those showing some decided advance are likely to attract much attention. It seems as if we had at present almost a sufficient variety in form and color, and that the desideratum now is in the line of good, marketable kinds. The gardener's interest in the shows has centered more in cultural improvements than in new varieties.

"The demand for flowers up to this year has been largely for yellows and whites, and these have been grown to the exclusion of most others, by many of the larger growers. This year, with the introduction in greater quantities of finely grown flowers, there has been a call for more variety, and willingness has been shown to pay roundly for them. The trade in large flowers has been unsurpassed, and it looks rather as if these alone were to be the chrysanthemums of

the future. It seems, however, that there are two other lines worth experimenting in, viz., the production of handsome and typical sprays, say of three flowers each, and, secondly, paying more attention to growing plants suitable for house decoration.

"It will not be easy for the commercial grower to bring himself to the point of view which makes anything but the biggest best. This is shown in the roses of the day, and, it may be, the people who buy the flowers like the monstrosities as well as the florist. There are signs in the air, however, that a reaction may set in, and that the criterion of a well grown flower will not always be size entirely. Even if size is required, a good showing can still be obtained by growing in a more natural way. The cluster of three is natural to the chrysanthemum, and if as carefully handled as in the one-flowered system, there seems no reason to doubt that sufficient size can be obtained, while a more characteristic effect would be given; the idea that chrysanthemums should be bought, like cabbages, by the pound, would be abolished. The long stems and fine foliage could easily be kept. Some experiments would be needed to find out the varieties best suited to this method of growing. Cut flowers so grown might not at once commend themselves to the mass of buyers.

"In regard to potted plants being offered for sale in quantities, there are some difficulties in the way; chiefly, because as compared with cut flowers, plants are cumbersome to handle not only in shipping but in distribution, and there is as yet, in our market at least, no decided demand for growing plants of any kind. The chrysanthemum is a good one to begin with; it seems in every respect a plant to be used as a whole, and is never so attractive as when of moderate size, and without that excessive staking which increases the natural stiffness of all the compositæ; a plant can be grown so that it will be well developed in every part, and yet not require the support of a stake for each individual flower as well as stem, nor need these stakes be arranged with too much firmness. Plants in six and seven inch pots would not be expensive to handle; they could be put on the market with good profit to grower and shopman, and become an important feature in the trade. A well grown plant fairly in flower, the

centers of the principal flowers just unrolling, will last in an ordinary living room in good condition from two to four weeks, with not nearly so much care as would be required to keep cut flowers one half this time ; a single plant, or a group is more effective than an equally costly arrangement of blossoms. The autumn shows have demonstrated how kindly chrysanthemums blend with most foliage plants, palms, ferns, cycads, ficus, etc. Where such a collection is kept, nothing better can be found to add to the interest of flowers during the fall and early winter months, and no better background could be desired to exhibit at its best the plant under consideration. It may be doubtful if a great demand will arise for flowering plants for these purposes, but the effort to introduce them is worth considering ; the result cannot be determined until they are marketed in larger quantities and in better condition than they have yet appeared.

“One good feature of this season's shows has been the more uniform excellence of the cut flowers ; last year, there were a few growers who staged specimens far above the average ; this year, there has been greater equality in this respect, and for large and well colored flowers, the rank and file of the gardeners have taken up the running, and pushed the leaders hard. The size of the blooms is immense, and is largely owing to the fact that for cut-flowers the plants are grown in beds, sometimes made on the floor of the house, where the piping allows this arrangement, sometimes on benches where carnations or other things can follow. More even conditions of moisture are by this method obtained and richer soil and more liquid manure are used. When possible, the glass is removed during the summer months. A plant carries from one to four flowers, and it is hardly necessary to say that disbudding is required. Another noteworthy point is, that many of the older sorts hold their own against the more recent introductions ; Jardin des Plantes and Fair Maid of Guernsey are good examples of this. Mrs. C. H. Wheeler, Cullingfordi, Edwin Molyneux, Comte de Germiny, Grandiflorum, are also successful competitors against the newcomers and the Neesima is one likely to keep its place for sometime. It takes a little time to get the knack of doing one's best with a new variety, so we cannot fairly make comparisons as yet with last year's seedlings. Mrs. Alpheus

Hardy has been exhibited this year not only in fine flowers, but also in some remarkably fine plants, showing that with proper care it can be grown satisfactorily. It is said, too, that it has proved a good money winner to the florists. Louis Boehmer, the pink ostrich plume, has been shown occasionally, but the color is not bright enough to make it very interesting; this is possibly owing to the distance it had travelled. Another hairy flower, this time of tubular form, has appeared in Lalla Rookh, a bronze or cinnamon-brown, which, although of not much character, may prove of use for breeding purposes. Others of this class are reported, but have not yet been exhibited.

“Belle Hickey, W. H. Lincoln, Kioto, Neesima and Lilian B. Bird are all favorites of the practical florists, while Mrs. Fottler, although of fine form and color, has the reputation of not carrying well; this is said too of Mrs. Langtry, one of the purest of whites, of large size and a good grower. Domination and Robt. Bottomley have been sent to market in excellent condition, but there is an opportunity here for improvement in shipping qualifications. From Philadelphia, Mrs. Bullock and Miss L. Canning come highly commended as marketable whites. E. G. Hill, yellow with purplish shading, is unique, and a flower of great substance. John Thorpe has no rival in its peculiar color, deep lake, unless it be in the seedling Mr. John Thorpe offers the present year, described as being of the color of a Jacqueminot rose. Ethel, Elaine, Christmas Eve and Gloriosum still please some large growers, even if they no longer make much showing at the exhibitions. Thunberg, yellow, seems a very satisfactory late bloomer and is certainly a fine flower, truly Japanese. The pale yellow tinge of the interior petals, free habit of growth and flowering will always make Moonlight a favorite. Among pinks should be mentioned, although none are of recent introduction, Bouquet Fait, Flamboyant, Belle Paule and Mad. C. Audiguier as being excellent and well worth growing. Marvel, white with a bright maroon center, is very distinct. Canon Farrar, white, tinged with pink at the base of the petals, and Mrs. Anthony Waterer, of great size, white with a blush tint, might be added; these last three are comparatively new.

“Among anemone-flowered chrysanthemums, Emily,

pink, with delicate yellow center ; Sabine, white, with a pale yellow center ; Mrs. Gane, an early white ; Mrs. R. Owen, also white and of good size ; Nelson, a large dull red ; Mrs. M. Russell, yellow, and Bessie Pitcher, rose with a lighter center, seem desirable and worthy of more general cultivation ; some of them when grown for single flowers make fine specimens and give a pleasing variety. Something too should be said for the Pompons, but so few are to be found that a select list would be hard to make. It seems a pity that such an interesting class should be so entirely overshadowed by the Japanese ; the profusion of flowers and their bright and natty appearance more than make up for what is lacking in size. It is not profitable to extend any list of these flowers, although it is difficult to pass by many favorites ; every gardener will have his own successes and failures. What can be well grown in one place is not always satisfactory in another.

“There remains to be said a few words about insects. With the more extensive and elaborate cultivation, as would be expected, there have appeared several new pests, the most injurious of which attack the plant while growing out-doors, both in field culture and in pots. In many places, the plants have been greatly damaged, and in some cases practically destroyed during the past season by what appeared to be a very small fly. The trouble begins soon after the plants have been put in their summer quarters, but does not become evident until they have attained some size ; then it will be seen that there is a marked failure in the growing points ; growth is stopped, and when new growth begins, it is again stopped ; and so on until the vigor of the plant is destroyed. This is probably caused by a leaf-hopper, but it is quite possible that other insects may help. These insects are described with care, and figured by J. G. Jack, of the Arnold Arboretum, in *Garden and Forest*, Vol. iii, No. 133, page 439, and remedies are suggested. It is doubtful whether this trouble is widespread, but when it comes it seems to stay and increase. When plants are grown under glass, the insects do not appear in sufficient numbers to do harm, and it is certainly a cure to lift and bring in the plants. Fumigation will drive the insects from the greenhouse if it does not destroy them. The mere work of lifting and potting in some cases seems to drive them away. Mr. Jack advises spraying with a kerosene

emulsion, or with pyrethrum powder. Apparently the leaf-hopper must be taken on the wing to kill; this is not easy to do, and makes constant repetitions necessary. Everyone who is troubled in this way should consult the article named. The so-called chrysanthemum fly, a much larger insect, is a cause of complaint in some quarters. The damage is done by the droppings discoloring the petals, mainly in white or light colored kinds; the harm is very slight and probably some easy plan of getting rid of this fly could be devised. Hand-picking would not be difficult. A leaf-borer which has appeared on the French marguerite (*Chrysanthemum frutescens*), seems more alarming. Tobacco fumigation seems to hold in check the fly which lays the eggs of the maggots; affected leaves should be destroyed."

The roses of the year are treated for me by E. G. Hill, of Richmond, Indiana: "The various rose firms of Britain and the continent have displayed their usual fertility of resource in putting upon the market over one hundred new roses, most of them seedlings. Of this great number probably ten or twelve will be found useful as bedders in our own country, while if even one tea variety proves a good forcing rose of pleasing color, good form and substance, and distinct from existing sorts, it will be given a hearty welcome by florists at large, and in another season or two will be found in all the leading cut-flower stores. Of the different classes of new roses sent out, our American growers usually concentrate their attention first on the teas and hybrid teas, in which we always find our most useful roses. The climbing teas being tender, are of little use except in those limited sections where the thermometer registers but a few degrees of frost; the hybrid perpetuals, though representing the highest ideal of a perfect rose, are not so popular as the everbloomers, from the fact that they flower but once in the season, and also that they require from two to four years to become established. Bengals and bourbons at the present time attract scarcely a passing notice. The polyanthas are gaining in popularity as the years pass, and little wonder, for such hardy, flower-covered bushes as Mignonette and Gloire des Polyanthas can not fail of popular appreciation. Clotilde Soupert, while showing rather too many of the traits of the tea family to be

as distinctly a polyantha as we might wish, is a great addition to our lists, and is destined to become as great a favorite as *Hermosa*, if only it proves as hardy as that sturdy sort.

"The best new teas of the year are these:

"Duchess Marie Salviata. (*Soupert & Notting.*) A strong, vigorous grower; flower large and double from long pointed buds. Color a fine chrome orange, with shadings of rosy flesh, the center pure saffron; sweet violet scented; the raisers claim this to be a good forcer. It is a cross between *Mme. Lambard* and *M. Kuppenheim*.

"Jeanne Guillaumez. (*Bonnaire.*) A very vigorous grower; flower large and double, of good form, with beautiful long buds. Color clear red, touched with salmon; center coppery red, with pale silvery shadings. Received first-class certificate from the Lyons Horticultural Society.

"Gustave Nadaud. (*Soupert & Notting.*) A free branching grower, with large double flowers; the outside petals are large and rounded, giving it an exquisite cup shape. Color vermillion, with clear touches of carmine lake and soft pink center. (*Mme. Lambard and Safrano.*)

"J. B. Varrone. (*Guillot.*) A fine grower; flower large and very double, with high center opening from long buds. Color soft china rose, changing to a bright deep carmine of even shading; an extra good rose, and very sweet; extremely variable in color, ranging all the way from soft flesh pink to deep china rose, with varying conditions of temperature.

"*Mme. Marthe du Bourg.* (*Bernaix.*) One of the finest of the new roses. The habit and foliage are beautiful, denoting a ready grower; the flower is large, perfectly double, and of beautiful form; the outer petals recurve at the edges, showing a beautiful pointed center; the color is creamy white, touched with carmine or pale heliotrope on the edges; texture heavy. A very promising rose.

"The best hybrid teas are as follows:

"Bona Weillshott. (*Soupert & Notting.*) A very strong grower; flower large and double, and of the centifolia form. Color rosy vermillion, with center of orange red; very sweet. (*Goubault and M. Baumann.*)

"*Mme. de la Collogne.* (*A. Levet.*) Bright rose color; large, double, and of perfect form. A vigorous grower.

"Mme. H. Montefiore. (*Soupert & Notting*.) A strong grower; flowers large, double and quartered. Color white, marbled soft flesh, with center of chrome or ochre yellow.

"Augustine Guinoisseau or White La France. An exquisite sport from La France, not white at all, but very much lighter than the parent; will probably be very widely grown in this country.

"The hybrid perpetuals of value are:

"Gustave Piganeau. (*Pernet-Ducher*.) Flowers extra large, equaling Paul Neyron in size, double and of cup form. Color a beautiful shade of red and brilliant carmine. Received four medals, and was illustrated in the *Journal des Roses*.

"Laforcade. Color brilliant carmine-red; flowers large and quite double; a strong grower. A variety of the very highest order.

"Mme. Renahy. (*Guillot*.) Flower large, double, and of fine globular form; color rosy carmine, with brighter center; reverse of petal soft silvery heliotrope. Very sweet and very free.

"Lady Arthur Hill. (*Dickson*.) A most vigorous grower, with flowers of the largest size, double, and finely formed. Color fine silvery rose of most pleasing shade. Seedling from Beauty of Waltham. Extra good.

"Roi de Suede. (*Soupert & Notting*.) One of the very darkest of hybrid perpetuals, with touches of brown in the shadings; very velvety in texture; a very distinct variety.

"Two new American teas are promising:

"Waban or Red Mermet. Catherine Mermet is a magnificent tea rose and universally admired; and its sports, so far, are keeping up the family reputation, judging by The Bride, our finest white, and now Waban, which is a Mermet of deep rose color, and the same splendid rounded form. As there can be no question as to its forcing qualities, and as it does not turn pale in dark weather, it will doubtless prove a great acquisition.

"Rainbow* hails from California, a sport from Papa Gontier; it might be described, in short, as a light pink Gontier striped and variegated with the true Gontier red; it has created great interest in the west, where it has been shown in fine shape."

* Annals Hort., 1889, 104.

Foreign roses.—American rose growers draw so largely upon European establishments that any account of the roses of 1890 must be very incomplete without some account of foreign novelties. The following two papers appear to be judicial in their estimates, and are likely to prove useful to our cultivators.

The following list of the novelties of 1890 was compiled by the editors of the *Journal des Roses*. The varieties are mostly of French origin, and the originator's description is given with each:

“Guillot & Sons, 27 Chemin des Pins, Lyon-Guillotiere, introduced three seedling varieties:

“Mademoiselle Christine de Noue (tea). The plant is vigorous and flowers abundantly. The flowers are very large, double, well formed and gracefully borne. The outer petals are imbricated, of a deep red-purple maroon color; those of the center are straighter, lake rose and light purple in color, blended with a beautiful silvery white; very fragrant.

“Miss Wenn (tea). Plant vigorous; flower large, double, well formed and china rose in color; a free-blooming variety.

“Madame la Comtesse de Bouchaud (noisette). Plant very vigorous and branching; buds long, flower very large, double, well formed; internally the petals are yellow saffron in color, externally yellowish-white.

“Three new roses are introduced by Joseph Bonnaire, 6 Chemin des Hérಿದೆaux, Lyons:

“Souvenir de Madame Sablayrolles (tea). Plant very vigorous; the branches are upright and covered with beautiful dark green foliage. The peduncle is very strong, and the flower is large, double, spherical, almost always solitary. Its color is apricot-rose blended with yellow, the edges of the petals being bordered with carmine, which passes into a white cream. This is an excellent variety for cut flowers. It is a cross of *Devoniensis* and *Souvenir d'Elisa Vardon*.

“Elisa Fugier (tea). Plant very vigorous, branches straight and somewhat erect; it is a variety closely related to *Niphetos*, but its habit is much superior; it does not drop its foliage, and its leaves are more abundant and always green. The buds are very long; flowers very large and double, and pure white except at the center, which is clear light yellow,

and the external surface of the petals, which is tinged with rose. It is exceedingly floriferous, very good for cut flowers, and is very hardy. It is a cross of an unknown variety with Niphetos.

"Henri Brichard (hybrid tea). The plant is very vigorous, the branches straight and erect, foliage large, dark bronze-green in color. The flower is large, very double and supported on a firm peduncle. Its color is pure white at the borders, the interior being bright red-carmine, shaded with rose-salmon. The flowers are produced abundantly and continuously.

"The firm of Ketten Bros., of Luxembourg, introduced three seedling varieties :

"Astra (hybrid tea). Flower rose-carnation, sometimes lighter at the borders of the petals, large, double, cup-shaped and solitary. The plant is of medium vigor and very floriferous.

"Chloris (hybrid tea). Flowers clear crimson-purple, very large, very double, very fragrant. Plant of medium vigor and very floriferous.

"Anna Scharsach (hybrid remontant). Flower clear rose, at the center often bright purple ; large, double, cup-shaped. Plant very vigorous and hardy. A cross between Baronne A. de Rothschild and Madame Lauriol de Barny.

"The following varieties were introduced by Messrs. Soupert and Notting, Luxembourg :

"Princesse de Sarsina (tea). Plant vigorous ; flower large, double and of beautiful form. The ground color is clear yellow, shaded with a light rose ; the center is apricot-yellow, tinged with vermilion. The flower is fragrant and blossoms in the fall. It is a cross of Madame Lambard and Sulfureux.

"Comtesse de Vitzthum (tea). Plant vigorous ; flower large, double, perfect in form. The external petals are light yellow, the center is a brilliant Naples-yellow ; very floriferous. This variety may be particularly recommended for grouping. It is a cross of Adele Jourgant and Perle des Jardins.

"Gribaldo Nicola (tea). Plant very vigorous, climbing. Foliage broad, large and glossy. Flower very large, very double and of the same form as Souvenir de la Malmaison.

Color silvery-white on a rose ground color, the center shaded with a nankeen-yellow, the under side of the petals being Isabelle rose; very fragrant. Cross between Bouquet d'Or and Sylphide.

"Charles de Franciosi (tea). Plant vigorous; buds long, well formed and orange-red in color. Flower large, double, broad, in the form of a rosette. The color is a chrome-yellow, shaded with a soft salmon-yellow. The exterior petals are lightly tinged with rose. This variety is particularly good for forcing in winter. Cross of Sylphide and Crombez.

"Comtesse Eva Starhemberg (tea). Plant vigorous and of good carriage; flower large, double and of perfect form; buds elongated, petals firm and broad; color a yellow-cream, the center being chrome-ochre, and the edges of the external petals tinged with a light rose. Cross of Etendard de Jeanne d'Arc and Sylphide.

"Joseph Degueul (hybrid remontant). Plant vigorous and straight; flowers large and double, having the exterior petals imbricated; color a brilliant lake-carmine blended with vermilion, the under side of the petals blood-red; very fragrant. A cross of Duhamel du Monceau and Charles Margottin.

"Mr. Moreau-Robert, Chemin de la Treille, near Angers, introduced the following:

"Madame Durand (tea). Plant very vigorous, almost sarmentous; foliage a beautiful purple; wood firm, somewhat thorny. The flowers are large and double, spherical, and open early; color a beautiful copper-yellow. The flowers are borne in corymbs, and are very abundant.

"Madame Simon (tea). Plant very vigorous, sarmentous, the old wood only slightly thorny; foliage beautiful red when young, passing into a light green; flower very large and double, of the same form as Souvenir de la Malmaison; color rose-white, sometimes slightly tinged with yellow; very floriferous. Seedling of Madame Bérard.

"Capitaine Basroger (moss rose). Plant exceedingly vigorous; foliage a beautiful deep green, the leaves consisting of 5-7 leaflets; wood very strong, with many very fine and hard thorns; flowers very large, well formed, spherical; color a bright carmine red, blended with black-purple. The plant bears corymbs consisting of 15-25 flowers.

“Souvenir de Victor Landeau (bourbon). Plant very vigorous ; foliage deep green ; the old wood straight, strong and thorny ; flowers very large, double and cup-shaped ; color bright red, shaded with carmine ; corymbs very strong and numerous.

“Commandant Larret de Lamalignie (hybrid remontant). Plant vigorous, wood somewhat flexible ; foliage light green ; flower large, double, opening well, and perfect in form ; color a beautiful red scarlet ; floriferous ; flowers in corymbs.

“Madame Lemesle (hybrid remontant). Plant very vigorous ; wood large and robust, armed with recurved prickles ; foliage beautiful deep green ; flowers large and double, globular, red velvety-purple passing into violet.

“Mr. Tesnier, near Angiers, introduced these varieties :

“Etoile de Angers (tea). Plant very vigorous ; the old wood green ; thorns few ; foliage glossy green ; buds long and borne on a firm peduncle ; flower large, very double, spherical and well formed. The ground color is copper yellow, largely bordered with red peach reflection from the bronzed petals.

“Madame Dorgere (tea). Plant vigorous ; wood deep green and thorny ; foliage light yellow ; buds elongated, oval ; peduncle long and firm ; habit excellent ; flower large, very double, spherical ; color flesh carnation, softly shaded, sometimes light salmon. The flowers remain half opened for a long time and become purple rose as they grow older. The variety is a cross between Sylphide and Catherine Mermet.

“Madame Charles de Rostang (hybrid remontant). Plant vigorous, older wood light green ; thorns few ; foliage broad and glossy green ; flower large, double, well formed ; color china-rose, the outer petals a soft rose-mallow, the veins being rose-carmine. A seedling of Comtesse d' Oxford.

“The following varieties were introduced by Mr. Vigneron, Olivet, near Orléans :

“Madame E. Forgeot (hybrid remontant). Plant very vigorous ; branches straight and firm ; foliage beautiful light green ; buds borne on firm leafy peduncles ; flowers medium to large, double, of fine form ; color a very clear and bright

cherry red ; very floriferous. Cross between Jules Margottin and Elizabeth Vigneron.

“Monsieur Jules Lemaitre (hybrid remontant). Plant very vigorous branches straight and firm ; foliage deep green ; flowers very large, double, spherical, and of a bright red carmine color ; habit perfect ; floriferous ; very fragrant. A seedling of Madame Isaac Péreire.

“Madame Eugene Sébille (hybrid remontant). Plant vigorous ; branches straight and firm ; foliage light green ; peduncle very firm ; flower large, double, finely formed ; color cherry red, the center slightly darker ; very floriferous. Seedling of Madame Charles Crapelet.

“Madame Schwartz, of Lyon-Guillotiere, introduced the following seedling varieties :

“Mademoselle Juliette Berthaud (bourbon). Plant vigorous ; foliage elegant ; flower medium in size, with reflexed petals ; color yellow-white, mingled with carnation and rosy white towards the center. The lower part of the petals is citron-yellow ; fragrant and remontant.

“Roger Lambelin (hybrid remontant). Plant vigorous ; foliage abundant, and light green in color ; flower medium size and well formed. The petals are clear red, margined and spotted with pure white and light rose ; stamens numerous and conspicuous.

“Madame Delville (hybrid remontant). Plant vigorous ; foliage beautiful ; flower very large, double, perfect in form, center compact ; color a bright rose, becoming lighter at the borders, and passing into clear rose ; the under side of the petals is silvery ; very fragrant. Seedling of Alfred Colomb.

“Eugene Verdier, of Paris, sent out the following varieties :

“Souvenir de Clairvaux (tea). Plant vigorous ; branches strong and erect ; foliage dark green and glossy ; thorns few ; flower medium to large, very double and well formed, borne on a firm peduncle ; color a beautiful shade of china-rose, the base of the petals being apricot-yellow, flushed with nankeen and marked with carmine ; floriferous and fragrant.

“Docteur Chopart (bourbon). Plant vigorous ; branches straight and firm ; thorns numerous ; foliage deep green ; flowers medium in size, and well formed ; color a soft beautiful rose.

“Docteur Bastien (hybrid remontant). Plant vigorous ;

branches erect and light green ; thorns few ; foliage deep green ; flowers medium to large, double, perfect in form, spherical ; petals broad and concave ; color a bright currant rose magenta ; very fragrant.

“*Souvenir de Cécile Vilin* (hybrid remontant). Plant vigorous, branches firm and straight, thorns not numerous, foliage dark green ; flowers large, double, well formed, like *Annie Wood* ; color carmine-amaranth, with bright purple.

“*Elie Lambert, Lyons*, introduced *Madame Elie Lambert* (tea). Plant exceedingly floriferous and uncommonly vigorous, although of small size ; buds borne on firm peduncles ; flower cup-shaped, well formed, its center rose color, and beautifully set off by the pure white of the exterior petals.

“*Mr. Veyssset, of Royat-les-Bains*, introduced *Madame Angelique Veyssset* (hybrid tea). Flower rose colored, streaked with bright red. It is a sport of *La France*.

“*Alexandre Bernaix, of Villeurbanne, near Lyons*, produced the following :

“*Mademoiselle Adelina Viviani-Morel* (tea). Plant sarmentous, foliage glossy ; the coloring is very clear apricot, passing into canary-yellow, with golden tints which fade into straw-yellow, relieved by carnation ; very fragrant.

“*Madame la Princesse Bassaraba* (tea). Plant small, vigorous, branching, very floriferous ; bud ovoid ; flower medium large and double ; color flesh carmine changing to carnation in the outer petals, and changing from a canary yellow to pale chrome while opening.

“*Souvenir de Mademoiselle Elise Chatelard* (dwarf polyantha). Plant dwarf branching at the base and forming a thick symmetrical bush ; foliage small, deep green above, paler on the under side ; flowers abundant, about an inch in diameter, and finely formed ; the color is a fresh red-carmine. The external petals are mucronate, those of the center crimped.

“*Jean Ducher, of Montplaisir-Lyons*, introduced the *Beauté de Grange de Héby* (hybrid tea). Plant vigorous, wood smooth, branches straight ; foliage glossy, bronzed green, thorns few. The flower is large, double, and borne on a firm peduncle ; color pure white, lightly tinged with yellow at the center. Cross between *Baronne A. de Rothschild* and *Madame Chédanne Guinoiseau*.

"Three roses were introduced by Mr. Pernet, of Charpenes-les-Lyons :

"Triomphe de Pernet père (hybrid tea). Plant vigorous, branches straight and firm ; flowers large, almost double, bright red, gracefully borne ; buds very long and opening easily ; the plant flowers continuously and abundantly. It is a cross between Monsieur Désir and General Jacqueminot.

"Marquise de Salisbury (hybrid tea). Plant vigorous, branches straight and firm, thorns numerous ; foliage dense, and dark green in color, bordered with red ; flowers medium to large, almost double, bright velvety red ; buds long and T-shaped ; very floriferous.

"Madam Dubost (bourbon). Plant vigorous, branching ; flowers borne in corymbs, almost double, medium to large, light carnation at the borders of the petals, and bright red at the center ; floriferous.

"Jean Perrier, of Lyons, sent out Professeur Ganiviat (tea). Plant very vigorous and floriferous ; flower well formed, large, double, and borne on a firm peduncle : color red, shaded with crimson.

"M. Liabaud, of Lyons-Croix-Rousse, introduced :

"Comtesse de Bernis (hybrid remontant). Plant vigorous ; branches straight, reddish ; foliage light green ; flowers large, double, bright rose ; very floriferous.

"Docteur Branche (hybrid remontant). Plant vigorous, branches firm, thorns few and small ; foliage glaucous and bearing small thorns on the under side ; flowers large, double, the petals being large and cherry red.

"Rougier-Chauvière (hybrid remontant). Plant very vigorous and the branches firm ; thorns strong, reddish, and numerous ; foliage large, deep green, armed with small thorns on the under side ; flowers large, double, velvety red-purple-amaranth.

"Madame Joseph Linossier (hybrid remontant). Plant vigorous, branches straight, thorns small and numerous, foliage light green and abundant ; flowers large, almost double ; color very soft rose, margined and marbled with bright rose. Sport of Madame Montet.

"Madame Pierre Liabaud (hybrid remontant). Plant very vigorous, branches firm and always terminating in four or five flower buds, thorns quite numerous ; foliage metallic-

green; flower large, double, arched, and carnation-white. Seedling of Madam Isaac Péreire.

"Souvenir de Lady Ashburton (tea) was introduced by Charlès Verdier, Ivry-sur-Seine. Plant very vigorous, branched, and floriferous; branches numerous, rather short, the bark red and slightly glaucous; thorns long, very sharp, curved; peduncles strong; sepals reddish; foliage glossy green above, glaucous and often tinged with red below; flowers large, double, and very variable in color, being copper-red, salmon-yellow, sometimes red, often intense red, light yellow, and presenting all these shades either separately or mingled, depending upon the stage of flowering; very fragrant. A vegetable chameleon.

"Nabonnand & Sons, of Golfe-Juan, introduced the following kinds:

"Princess Marguerite d'Orléans (tea). Plant very vigorous; flower very large, double, perfect, peduncle long and firm; buds long and well formed; the outer petals very delicate pale rose, silvery on the lower side, the inner ones bright carmine red. Cross of Papa Gontier and Isabelle Nabonnand.

"Général de Mertchansky (tea). Plant very vigorous; flower large, double, erect, and of perfect form; buds elongated and opening well; wood reddish, thorns few; color a soft carnation rose, the center more bright; very floriferous.

"Jaune Nabonnand (tea). Plant very vigorous; flower very large, double, opening easily; buds long and well formed; wood reddish, thorns few, foliage large. Color a chrome yellow, tinted with chamois, the center somewhat copper colored, the under side of the petals much lighter; outer petals very large; floriferous.

"Maurice Rouvier (tea). Plant very vigorous and hardy, forming a large bush; flower very large and double, of perfect form; buds long, opening well; wood reddish-brown, thorns few; foliage light green; flowers abundantly and continuously. Color a soft rose, lightly veined with red, the outer petals somewhat lighter.

"La Chanson (tea). Plant very vigorous; foliage large, deep green; flower very large, double, erect, usually solitary on a firm peduncle; buds long and perfect; color bright rose-carmine, nacreous, the center darker, gilded. A cross of Isabelle Nabonnand and Général Schablikine.

"Etienne Levet, Montplaisir-Lyon, sent out Mademoiselle Joséphine Viollet (noisette). Plant vigorous, hardy, sarmentous; flower very large and double, opening well, of perfect form, very fragrant; color copper-yellow at the center of the petals and rose-salmon on the borders, sometimes a soft rose white; buds long, foliage dark green. Cross between Ophirie and Maréchal Niel.

"The following sorts were put out by M. Corbœuf-Marsault, of Orléans:

"Mademoiselle Marie-Louise Bourgeois (moss). Flowers large, double, well formed; color a light carnation-white upon a ground color of chrome-yellow; fragrant and vigorous.

"Madame Cécile Morand (hybrid remontant). Plant moderately vigorous; flower large, very double and well formed; color deep carmine-red, the under side of the petals silvered; very floriferous.

"Mademoiselle Madeleine Delaroche (tea). Plant sarmentous: flower large, very double, carnation-rose; very floriferous. A seedling of Mathilde Lenaerts.

"M. Chauvry introduced two varieties:

"Mademoiselle Thirion-Montauban (tea). Plant very vigorous, of good habit, hardy; foliage deep green, reddish-purple on the under side; buds round, usually solitary; flowers cup-shaped, large, well formed; color white, center light yellow, the borders of the petals rose, sometimes dotted with red. Seedling of Shirley Hibberd.

"Souvenir de Pierre Magne (tea). Plant vigorous, branches straight, foliage deep green; flower medium to large, semi-double; color a deep china-rose on a copper-yellow ground color, passing to light rose, the under side of the petals a deeper rose; very floriferous. Cross of Souvenir de David d'Angers and Madame Bérard.

"Léveque & Son, of Ivry-sur-Seine, gave the following:

"Mademoiselle Andrée Worth (bourbon). Plant very vigorous; flower large, double, perfect in form; color white, slightly tinged with rose or pure carmine, shading exceedingly delicate.

"Belle Yvryenne (hybrid remontant). Plant very vigorous; foliage glaucous-green and abundant; flower very large and double, perfect in form; color a bright rose-red, mingled with white and carmine.

• “General Korolkow (hybrid remontant). Plant very vigorous; foliage dark green; flower large, double, well formed; color deep red-carmine, shaded with purple and brown.

“Madame Brault (hybrid remontant). Plant vigorous; foliage lanceolate, light green; flower large, double, well formed; color bright clear rose.

“Madame Théodore Vernes (hybrid remontant). Plant vigorous; foliage abundant and dark green; flower large, double, well formed; color bright rose, the borders of the petals having a softer hue.

“Professeur Chargueraud (hybrid remontant). Plant vigorous; foliage abundant and deep green; flower large, double, well formed; color deep red, marbled with brown and crimson-red.

“Professor Lambin (hybrid remontant). Plant vigorous; foliage glaucous-green; flower large, double, well carried, the color a bright rose or clear red. In form, color and floriferousness it is of the first order.

“Eiffel (multiflorus climbing, not remontant). Seedling of Griffériaie. It has the foliage of the parent, but the flowers are larger, and deep red-crimson; very floriferous.

“Giffard (multiflorus climbing, not remontant). Seedling of Griffériaie; foliage same as that of the parent but the flower is larger, well formed, and of a bright clear red-carmine color; very floriferous.

“Recapitulating, we find that the varieties are thus divided :

Tea.....	27
Hybrid Tea.....	7
Hybrid Remontant.....	24
Bourbon.....	5
Noisette.....	2
Multiflorus, not Remontant.....	2
Moss.....	2
Dwarf Polyantha.....	1
Total.....	70."

Another view of new foreign roses is presented by C. P. Strassheim in *Rosenzeitung*, as follows :

“During my many visits in the Moselle district I had excellent opportunities for visiting the roseries of Lambert & Reiter, Trier, and of Soupert & Notting, Luxembourg, and I closely watched the new varieties that were being tested. In

company with Mr. Notting, I repeatedly examined the novelties in the latter place, and the following varieties impressed me as being particularly valuable. I even believe that in the future they will occupy permanent positions in our gardens. There are still many other promising varieties, but they were not in a condition most favorable for judging of their merits.

"Of the many varieties that I saw the one which struck me most favorably as regards form and color was the rose *Madame Moreau* (tea) of Moreau-Robert. The deep copper-yellow color of this rose can be found in no other. The shade is sometimes approached in *Beauté de l'Europe*, and perhaps in *Madame Bérard* and a few others, but in none is there such a rich color as in *Madame Moreau*. If we consider *Clotilde Soupert* (polyantha) as a novelty of 1890, it nevertheless hardly requires mention here, for it is already so well known on account of the color and number of its flowers.

"Another excellent tea rose is *Sappho*, of W. Paul & Son. The color is a deep straw yellow. The buds are almost perfectly spherical, but when expanded the flower is in the form of a cup. The plant is of very free habit, blooms abundantly, and is by no means to be neglected for cut-flowers.

"A third tea rose is *Miss Marston* (of Pries). Its ground color is white with a flush of yellow, the outer petals having a margin of pink at the tips, passing into apricot-yellow towards the center. When the flower is fully opened the yellow recedes, the inner petals appear to be white, and the outer ones assume a deeper rose-pink. The form is spreading and open, producing a magnificent effect.

"*Duchesse Marie Salviati*, of Soupert & Notting, should occupy the fourth place. The form of the flower is very different from that of the others. The buds are very long, as in *Niphetos* when grown under glass, *Reine Marie Henriette*, and a few others, but still the flower opens very easily. What gives this variety an especial value, besides its form, is its peculiar coloring. The shades are a dark orange-yellow, flesh-colored rose, and the finest peach-red. Since these tints run together, the gray-rose of *David Pradel* may sometimes be seen on individual flowers. In coloring, this variety perhaps approaches most closely the beautiful old *Mont Rose*, but in form it is radically different.

"The tea rose *Rheingold*, of Lambert & Reiter, must also

be mentioned on account of the beauty of its form and color. Unfortunately it is of rather weak growth, due probably to its continuous flowering. The coloring is almost exactly the same as that of William Allen Richardson, but the form of the flower is regular and faultless. It is an excellent rose for bouquets.

"Another tea rose worthy of mention is *Jaune Guillaumez* (of Bonnaire). Its buds are also long, and the flower is of a brick-red color, passing into a salmon-yellow towards the center. This coloring is not often found in roses, and although we have pink tea roses which pass into various tints of yellow towards the center, there is none possessing such a red color as the *Jaune Guillaumez*. The form of the flower is also very regular and beautiful.

"Among the tea hybrids I could not fail to notice *Bona Weillschott* (of Soupert & Notting) on account of its brilliant color. This rose may be particularly recommended for grouping on a lawn because of the abundance of its flaming carmine flowers.

"The above are all seedling varieties, and may be highly recommended.

"I shall now mention a few sports, of which two are exceptionally good. The best, most beautiful and undoubtedly the most valuable is the tea hybrid *Augustine Guinoisseau* (of Guinoisseau & Sons), or *White La France*. This rose has the same character of wood, foliage, growth and abundance of bloom as our old *La France*, and the flowers have the same form, only they are white. It is a sport of *La France*, and so much resembles the parent form that if without flowers it would be mistaken for it. When opening, the blossom is of a light cream color, such as is found in many other white roses, as *Elise Boelle*, *Madame Nomann*, etc.

"A second rose, a pure tea, is *The Queen** (of Dingee & Conard). This comes from the old *Souvenir d'un Ami*, and has its well known characters, only the flower is pure white.

"Another white tea rose, *Madame Olga* (of Leveque), is also said to be a sport, although known for a long time. I have a suspicion that M. Leveque does not possess our *Grossherzogin Mathilde* or else this sport would have been known

*See *Annals Horticulture*, 1889, 104.

to him. I do not think I am mistaken, for the form and color of the flower, the wood, growth and foliage of this sport resemble those of Grossherzogin Mathilde as much as one egg does another.

"A third white tea rose is Climbing Niphetos (of Keynes & Co). I am not very well satisfied with this rose either, for what I have seen of the Climbing Niphetos is all Niphetos with very little climbing about it. If that is to come later, the originator unfortunately forgot to mention the fact.

"In conclusion; I must mention another tea hybrid, one which possesses all the characteristics which a good rose should not have. This is the White Lady (of W. Paul & Son). But it is very often of a pink color; indeed, I have found this to be the rule. Judging from most of the plants one would suppose they were Lady Mary Fitzwilliam, of which the White Lady is supposed to be a sport, nor is there any cause for complaint about an unusually strong growth, for not only is this moderate, but indeed very moderate. Such roses, especially if they are sports, had better remain with the originators. However, I shall not pass final judgment, but rather hope that I am mistaken, and that time will remedy the defects of these two roses. Nevertheless I stand by what has been said in regard to the varieties first mentioned, and I hope to speak favorably of those that were not in good condition, at their next period of flowering."

Orchids. Among professional growers and fanciers, orchids have received the usual amount of attention during the year, and the extent of the introductions in this country can be learned from the list of introductions given on a later page. Popular interest in these plants is also growing, but there are few general cultivators who attempt to grow them to any extent. The interest appears to be rather one of curiosity, and exhibitions of them are always well attended. The interest in orchids in England appears to be unabated, and as we draw our supplies largely from thence, I have obtained from W. J. Bean, of the Royal Gardens, Kew, the following complete list of introductions into that country during 1890:

Name.	By whom raised or introduced.	Country or Origin.
<i>Ærides Augustianum</i>	Linden	Phillipine Islands.
" <i>d'Ansonii</i>	Low	Natural hybrid? Burmah.
<i>Angræcum Henriquesianum</i>		Island of St. Thomas, West Africa.
" <i>primulinum</i>	Low	Natural hybrid, Madagascar.

<i>Name.</i>	<i>By whom raised or introduced.</i>	<i>Country or Origin.</i>
<i>Bulbophyllum lemniscatoides</i> . . .	Lansberge . . .	Java.
<i>Calanthe Mylesii</i> . . . . .	. . . . .	Garden hybrid, <i>C. nivalis</i> × <i>C. Veitchii</i> .
" <i>rubens</i> . . . . .	. . . . .	Langkawi Islands, Malay Peninsula.
" <i>Veitchii</i> , var. <i>alba</i> . . . . .	. . . . .	Garden hybrid.
<i>Cattleya Ballantianiana</i>	Sander	" <i>C. Trianae</i> × <i>C. Warscewiczii</i> .
" <i>Gaskelliana</i> , var. <i>picta</i> . . . . .	. . . . .	Venezuela.
" <i>granulosa</i> , var. <i>Buyssoniana</i>	Linden	Guatemala.
" <i>intricata</i> , var. <i>maculata</i> . . . . .	. . . . .	Brazil.
" <i>labiata</i> , var. <i>Warocqueana</i>	Linden	South America.
" <i>Rex</i>	"	Central America.
" <i>superba</i> , var. <i>alba</i>	Rand	Amazon Valley.
<i>Coryanthes Bungeirothii</i>	Linden	Venezuela.
<i>Cymbidium Tracyanum</i>	Sander	Burmah.
<i>Cypripedium Alcides</i>	Sander	Garden hybrid, <i>C. insigne</i> × <i>C. hirsutum</i> .
" "Alice"	"	" <i>C. Stonei</i> × <i>C. Spicerianum</i> .
" "Alfred"	Drewett	" <i>C. venustum</i> × <i>C. Phillipinense</i> .
" <i>Antigone</i>	Veitch	" <i>C. Lawrenceanum</i> × <i>C. niveum</i> .
" <i>Aylingii</i>	Ayling	" <i>C. niveum</i> × <i>C. ciliolare</i> .
" <i>Buchanianum</i> . . . . .	. . . . .	" <i>C. Spicerianum</i> × <i>C. Druryi</i> .
" <i>Castleanum</i>	Sander	" <i>C. hirsutissimum</i> × <i>C. superbum</i> .
" "Constance"	Drewett	" <i>C. Stonei</i> × <i>C. Curtisii</i> .
" <i>Cythera</i> . . . . .	. . . . .	" <i>C. Spicerianum</i> × <i>C. purpuratum</i> .
" <i>Deboisianum</i>	Vervaeke	" <i>C. venustum</i> × <i>C. Boxallii</i> , var. <i>atratum</i> .
" <i>Doris</i>	Cookson	" <i>C. venustum</i> × <i>C. Stonei</i> .
" "Elinor"	Drewett	" <i>C. selligerum</i> × <i>C. Veitchii</i> .
" <i>Eyermannianum</i>	Sander	" <i>C. barbatum</i> × <i>C. Spicerianum</i> .
" "H. Ballantine"	Veitch	" <i>C. Fairrianum</i> × <i>C. purpuratum</i> .
" <i>Hera</i> . . . . .	. . . . .	" <i>C. Spicerianum</i> × <i>C. villosum</i> .
" <i>Hookeræ</i> , var. <i>Volutanum</i>	Low & Sander	Borneo.
" <i>insigne</i> , var. <i>longisepalum</i>	Sander	Northern India.
" <i>insigne</i> , var. <i>Macfarlanei</i> . . . . .	. . . . .	" "
" <i>Leeanum</i> , var. <i>biflorum</i> . . . . .	. . . . .	Garden hybrid, <i>C. insigne</i> , var. <i>Chantinii</i> × <i>C. Spicerianum</i> .
" <i>Leeanum</i> , var. <i>giganteum</i>	Heath	" <i>C. insigne</i> × <i>C. Spicerianum</i> .
" <i>Maynardii</i>	Sander	" <i>C. purpuratum</i> × <i>C. Spicerianum</i> .
" <i>Niobe</i>	Veitch	" <i>C. Fairrianum</i> × <i>C. Spicerianum</i> .
" "Numbrian"	Drewett	" <i>C. insigne</i> , var. <i>Maulei</i> × <i>C. calophyllum</i> .
" <i>Numa</i>	Veitch	" <i>C. Lawrenceanum</i> × <i>C. Stonei</i> .

<i>Name.</i>	<i>By whom raised or introduced.</i>	<i>Country or Origin.</i>
<i>Cypripedium</i> <i>Cenone</i>	Sander	Garden hybrid, <i>C. Hookeræ</i> × <i>C. superbiens</i> .
" <i>Osbornei</i>	Osborne	" <i>C. Harrisianum</i> , var. <i>superbum</i> × <i>C. Spicerianum</i> .
" <i>Pollettianum</i>	Sander	" <i>C. calophyllum</i> × <i>C. venustum</i> .
" <i>Siamense</i> . . . . .	. . . . .	Bangkok, Siam.
" <i>Vipani</i>	Vipan	Garden hybrid, <i>C. niveum</i> × <i>C. Phillipinense</i> .
" <i>Weidlichianum</i>	Sander	" <i>C. Hartwegii</i> × <i>C. Schlimii</i> .
" <i>Youngianum</i>	Sander	" <i>C. superbiens</i> × <i>C. Roebelenii</i> .
<i>Dendrobium</i> <i>atroviolaceum</i>	Veitch	Eastern New Guinea.
" <i>Cassiope</i> (hybrid)	Cookson	<i>D. Japonica</i> × <i>D. nobile</i> , var. <i>albiflorum</i> .
" <i>Venus</i>	"	Garden hybrid, <i>D. Falconerii</i> × <i>D. nobile</i> .
<i>Lælia</i> <i>anceps</i> , var. <i>Thomsoniana</i> . . . . .	. . . . .	Mexico.
" <i>Tresederiana</i>	Statter	<i>Cattleya crispa</i> × <i>Cattleya Loddigesii</i> .
<i>Lælio-Cattleya</i> " <i>Proserpine</i> "	Veitch	Garden hybrid, <i>Lælia Dayana</i> × <i>Cattleya velutina</i> .
<i>Masdevallia</i> <i>Costaricensis</i>	Sander	Costa Rica.
" <i>fulvescens</i>	Hoesman	New Granada.
" <i>guttulata</i> . . . . .	. . . . .	Tropical America.
" <i>Lowii</i>	Low	New Granada.
" <i>Measuresiana</i>	Sander	Garden hybrid, <i>M. Tovarensis</i> × <i>M. amabilis</i> .
" <i>O'Brieniana</i> . . . . .	. . . . .	New Grenada?
" <i>Rolfæana</i>	Sander . . . . .	. . . . .
" <i>Stella</i>	Hincks	Garden hybrid, <i>M. Estrada</i> × <i>M. Harryana</i> .
<i>Maxillaria</i> <i>longisepala</i>	Linden	Venezuela.
<i>Moorea</i> <i>irrorata</i> . . . . .	. . . . .	Tropical America.
<i>Odontoglossum</i> <i>Leroyanum</i>	Leroy	Garden hybrid, <i>O. crispum</i> × <i>O. luteopurpureum</i> .
" <i>Wattianum</i>	Sander	Natural hybrid.
" <i>Youngii</i> . . . . .	. . . . .	Mexico.
<i>Oncidium</i> <i>Larkinianum</i> . . . . .	. . . . .	Brazil.
" <i>Leopoldianum</i>	Linden	Andes.
<i>Phaius</i> <i>Cooksonii</i>	Cookson	Garden hybrid, <i>P. Wallichii</i> × <i>P. tuberculatus</i> .
<i>Phalænopsis</i> <i>Schilleriana</i> , var. <i>alba</i> . . . . .	. . . . .	Phillipine Islands.
<i>Rodriguezia</i> <i>Fuerstenbergii</i>	Sander	New Grenada.
<i>Scaphosepalum</i> <i>antenniferum</i>	Shuttleworth	Tropical America.
<i>Sobralia</i> <i>Lowii</i>	Low	New Granada.
" <i>Sanderæ</i>	Sander	Central America.
" <i>Wilsoniana</i> . . . . .	. . . . .	. . . . .
<i>Sophr-Cattleya</i> <i>Calypso</i> (hybrid)	Veitch	<i>Sophronitis grandiflora</i> × <i>Cattleya Harrisoniana</i> .
<i>Trichopilia</i> <i>punctata</i>	Sander	Costa Rica.
<i>Vanda</i> <i>Amesiana</i> , var. <i>alba</i> . . . . .	. . . . .	India.
<i>Zygopetalum</i> <i>caulescens</i>	Sander	Brazil.
" <i>Jorisanum</i>	Linden	Venezuela.
" (Bolea) <i>Whitei</i>	White	New Granada.

General Foreign Notes. W. Watson, of the Royal Gardens, Kew, writes as follows to *Garden and Forest* of the new ornamentals of 1890:

"The whole catalogue of the new plants of last year contains scarcely anything of exceptional merit. Not even among

orchids, usually so rich in new prizes for the cultivator, is there any one plant of extraordinary interest or beauty equal to those we already possessed, though there are not a few which might be classed as first-rate acquisitions did they not resemble so closely others already in cultivation. The question naturally arises, how is it that so few good plants are introduced now, compared with the rich harvest each year brought, say in Dr. Lindley's time, or even later? Have nurserymen and others interested discovered that more can be made out of the material already at hand by cross-breeding, selection, etc., than out of new introductions? It cannot be that the ground is exhausted, that everything worth having has been secured. There are scores, one may safely say hundreds of beautiful plants known to botanists which have never yet been seen in the garden. China, Upper Burmah, New Guinea, Madagascar, Africa and South America teem with good garden plants of all kinds. Even ground already beaten over by collectors contains many beautiful plants unknown in horticulture, while among early introductions, which have since disappeared from gardens, there are a great number of first-rate things. Of course we have an enormous number of beautiful plants in every department of the garden, and, as many would say, more than sufficient for our needs. Yet a new introduction of sterling merit is certain to find general favor, and while we all love old favorites we are always ready to welcome new friends.

"Orchids.—Perhaps the most interesting new orchid of 1890 is *Moorea irrorata*, a new genus, which flowered at Glasnevin, and is named in compliment to the curator, Mr. Moore. It is allied to *houlettia*, has a spike eighteen inches long, bearing a dozen fleshy flowers, two inches across, and colored rich reddish-brown. Unfortunately, Mr. Moore's plant is unique, and we do not even know of what country it is a native. *Dendrobium Macfarlanei*, introduced and flowered by Messrs. J. Veitch & Sons, is beautiful in flower, but it comes from New Guinea, and, like almost all the *dendrobiums* from that region, it is, unfortunately, too difficult to manage to ever find general favor. Among *cattleyas* the only new introductions of note are *C. Warocqueana*, *C. Lindeni* and *C. Rex*, of the Messrs. Linden. The first-named is an improved *C. Gaskelliana*, the second a good *C. labiata*, and the third not unlike

the white *C. aurea*, known as *C. Imschootiana*. *Cymbidium Tracyanum* is a big-flowered *C. Hookerianum*, the older name for which is *C. grandiflorum*. Three new sobralias, named *S. Lowii*, *S. Sanderæ* and *S. Wilsoni* differ only slightly in color from species already known in gardens. There are only two newly introduced cypripediums—*C. Schomburgkii* and *C. Siamese*—and these are scarcely more than botanical curiosities. The same may be said of the seven new species of masdevallia. This genus is attracting an unusual amount of attention just now, as is shown by the fact that more new species have been introduced lately than of any other genus of orchids. The pick of the lot is *M. Lowii*, which has the habit of *M. Chimara*, tailed flowers, three inches across, and white with purple spots. Varieties of species already established in gardens continue to appear among the numerous plants annually imported, and some of these are valuable. Cattleyas have produced *C. Lawrenceana*, var. *Vinckii*, with flowers of a decided bluish or magenta hue; *C. aurea*, var. *Imschootiana*, with white sepals and petals and a richly colored lip; *C. granulosa*, var. *Buyssoniana*, with white sepals and petals. *Lælias* have revealed several excellent varieties, particularly in *L. præstans*, *alba* and *L. elegans*, *Broomeana*.

“Hybrid orchids eclipse in beauty and interest the new introductions. Best of all is *Phaius Cooksoni*, a hybrid between *P. tuberosus* and *P. Wallichii*, raised by Mr. Norman Cookson. It has the constitution of the latter parent and the elegance of the former, plus a rich rosy color. This orchid ought to prove a useful garden plant. Equaling the phaius in interest is the hybrid *Odontoglossum Leroyanum*, raised by M. Leroy, gardener to Baron E. de Rothschild, at Gretz, its parents being *O. crispum* and *O. luteo-purpureum*. It is the first hybrid odontoglossum originated in the garden. Equally interesting are the two bigeneric hybrids produced and flowered last year by Messrs. J. Veitch & Sons—namely, *Epiphronitis Veitchii* and *Sophro-Cattleya Calypso*. *Masdevallia stella* is an additional hybrid in this genus. Dendrobiums have produced several beautiful hybrids, those exhibited by Sir T. Laurence at the beginning of the year being at least as beautiful and interesting as the best of those previously raised; they are named Juno, Luno, Chrysodiscus and Melanodiscus. Something like thirty hybrids have been added to cypripedium, and, whilst a

few of them are good, most of them are of no account. The cream of them are Aylingii, H. Ballantine, Pollettianum, Vipan and Osbornei. Cattleyas and lælias have added nothing particularly noteworthy.

“Stove and Greenhouse Plants.—The most interesting new plants in this department are the following: *Heliamphora nutans*, which has been successfully introduced from Roraima by Messrs. Veitch and which flowered in their nursery last year. It is a near ally of *sarracenia*, having erect, pitcher-like leaves and regular white flowers not at all like those of *sarracenia* and *darlingtonia*. Hitherto, however, the *heliamphora* has not shown a disposition to grow freely under cultivation. Messrs. Veitch have also distributed three new *nepenthes* of good quality—namely, *N. stenophylla*, a narrow pitched species not unlike *N. Curtisii*, and two varieties of the excellent *N. Burkei*, named *prolifera* and *excellens*.

“*Clematis Stanleyi** must be numbered among the prizes of last year, but it needs no more than mention in these pages. *Hæmanthus Lindeni* is a handsome species in the way of *H. Kalbreyeri* and *H. puniceus*. Mr. Bull's *Sonerila orientalis* and varieties are pretty additions to this class of stove plants; they have prettily-marked foliage, a free branching habit, and produce bunches of bright-rose attractive flowers in profusion. A new fern in the way of *Pteris Cretica*, but far more elegant, has been introduced by Mr. Bull and distributed under the name of *Pteris ensiformis*, var. *Victoriae*. This will become popular as a table plant, as its fronds are semi-erect, very graceful and prettily mottled with silvery gray on a bright green ground.

“*Calla Elliottiana* is a plant which ought not to be lost sight of, as it has all the charm of the common *C. Æthiopica*, differing only in the clear sulphur-yellow of the spathe. *C. Æthiopica*, var. Little Gem, is remarkable in having small flowers, and leaves scarcely a foot high.

“*Cineraria lanata*, a tall, handsome-flowered greenhouse plant, and *Dipladenia atropurpurea*, with rich purplish-maroon flowers, were reintroduced into gardens last year after an absence long enough to make them practically new.

“Hardy Plants.—*Lilium Henryi* is the most interesting and promising of these. It has already been noted in *Garden and*

* Figured and described in Gard. & For., Oct. 22, 1890, 512, 513.

Forest,* but I may supplement the information already given by recording the fact of the bulbs having stood uninjured the severe weather here of the past two months. *L. Bolanderi* is another new lily, small-flowered, almost black in color and likely to please those who cultivate this beautiful but somewhat refractory genus. Three new species of gladiolus, namely, *G. decoratus*, *G. primulinus* and *G. Kirkii*, flowered at Kew last year, and were so distinct in color and size as to have attracted the attention of breeders of these plants. These three will no doubt eventually be heard of again. *Thalictrum Delavayi*, a pretty hardy plant from south-western China, completes the list of new, good, hardy, herbaceous plants.

“Trees and Shrubs.—*Cytisus scoparius*, var. *Andreanus*, is the only beautiful new plant in this department. It is a seedling variety of the common broom, the flowers large, rich yellow, with the wings colored velvety maroon. Grafted on short stocks of the type it makes a presentable pot-plant and flowers freely when small, so that it should prove valuable in spring as a greenhouse plant.”

The fear expressed by Mr. Watson that we are giving our attention too exclusively to the improvement of old plants is no doubt well founded. The days of active and general introduction of new species have passed away. It is but natural that our chief effort should be that of ameliorating the rich and varied harvest of a few decades ago, but there must still remain in foreign lands more plants worthy of introduction than we now have in our gardens. Even the most familiar countries still possess treasures for us. We have drawn so largely upon Japan, for instance, for our fruit and ornamental plants that there is a common feeling that it holds nothing more for us. I have therefore asked Professor George-son, of the Kansas Agricultural College, who was for three years connected with the Imperial College of Agriculture in Japan, to write upon the question, What more can Japan contribute to our horticulture?

“No other country of its size has contributed so much to enrich and beautify our gardens as Japan. There is not a pleasure garden, scarcely a door yard, in the land, with a modest collection of shubbery, which does not contain representatives

* iii (1890), 428, 484, 525.

from that charming little country. But can we expect more from that quarter? The answer is a distinct affirmative. It has still many gems to offer which now are unknown to us or known only to botanists, and many which we do possess are not appreciated.

"The writer does not pretend to know all that may be found there, but will call attention to a few things that have come under his observation. Japan's ability to contribute to our horticulture is especially strong in the line of ornamental plants. It is not that it lacks vegetables and fruits unknown or unsuited to American gardens, for the list of these is long and interesting, but their adoption here is more a matter of fashion and caprice than is the case with ornamental plants. A handsome new shrub or tree is always and readily appreciated by everybody, but when a new vegetable becomes a candidate for favor, its success depends largely on the art of cooking, and perchance its use involves an alteration in our accustomed diet, which is almost sure to prove fatal to its general culture. The public stomach is exceedingly conservative. The finocchio of Italy and the celeriac of Holland and Germany have never become favorites in America, although their value is conceded here, and they are highly esteemed at home. We should probably not relish Japanese radishes which are a foot and a half in length and four inches thick throughout, but prepared as they are in Japan in a kind of pickle and eaten as a condiment with rice, I can testify that one can learn to like them. It would not be difficult to enumerate a score of vegetables worthy of culture for their intrinsic merits, but I shall here confine myself chiefly to their ornamental plants, their culture at home, if cultivated at all, and the merits which recommend them to this country. And in order that we may understand their taste in landscape work, and the better appreciate the plants they grow, let us first take a brief glance at the conditions under which these have been developed.

"We of the western hemisphere are apt to consider Japanese efforts at dwarfing trees and shrubs as bad taste and a trifling, inexcusable waste of time and energy, and we cannot understand their love for miniature representations of natural scenery in their gardens. Nevertheless, a Japanese garden has a grotesque charm about it which grows in strength as one discovers the motive of the arrangement. The development of

the taste which takes expression in dwarfed forms, miniature mountains and streams has no doubt been largely influenced by the cramped conditions under which the people live. The 40,000,000 people in Japan are huddled together on about 20,000 square miles of country. This one fact throws light on many otherwise inexplicable features of their agriculture and horticulture. It explains why the land is nearly everywhere worked by hand. The farms, or rather gardens, are too small to support beasts of burden in addition to the people. It explains the laborious, painstaking care with which every foot of soil is worked and cropped twice and often three times a year. It explains the industrious gathering and saving of fertilizers, and the almost miserly economizing of space for all purposes. It has made the Japanese a nation of horticulturists. The whole cultivated area is one vast garden. This fact, too, is no doubt also a leading cause in the dominating taste for dwarf forms in ornamental trees. Their pleasure gardens, often only a few yards square, did not afford room for free-growing trees, and what thus had its origin in necessity has become a national characteristic. In their fields and cultivated patches there is no space especially dedicated to vegetables, as with us. Their peas, beans, greens, radishes and yams grow side by side with wheat, barley and other grains which would here be denominated field crops. The irrigated rice alone cannot be classed with the garden crops, as it is often grown over extensive tracts of low-land to the exclusion of everything else.

“The garden proper is a flower and pleasure garden altogether. This enclosure either surrounds the house or in most cases, in towns and villages, is situated back of the house, and is very generally fenced by a hedge. It is crowded with dwarf trees or low shrubs, has usually a lake or small pond, or at least a basin in which water plants are growing, also a more or less tortuous stream crossed by a bridge, an artificial mound, a stone lantern and perhaps a grotto, all arranged with much skill. The writer has seen all this in a garden twenty feet square. These same features are dominant in all cases. The rich man's garden may be larger, even park-like, but we find the same attempt to imitate nature by artificial mounds to represent hills, and lakes, streams, grottos and the landscape adorned with the favorite trees and shrubs, with bridges,

stone lanterns and sometimes also buildings. Buddhist and Shinto temples are numerous, for, according to their light, the Japanese are a religious people. The grounds dedicated to these temples constitute their public parks which are open at all times, and where the people gather for recreation and amusement. They differ from the gardens in that they show little or no attempt at artificial landscape work, and usually contain groves of majestic trees, while dwarfed and trained specimens are comparatively scarce.

“What trees and shrubs do we find in these places? In the temple groves forest trees predominate. *Cryptomeria*, bamboo, pines, keaki, oak, camphor trees, ginkgo trees, camellias, flowering cherries and plums, and some shrubs especially regarded as sacred, like the *Illicium religiosum*, are the leading trees. In the gardens the available space generally controls the character of the flora. The larger forest trees are often absent; flowering cherries and plums are always present; dwarfed and trained forms of pine and other evergreens are great favorites, and besides these a large variety of shrubs and flowering plants, some of which are well known here, while others are not.

“This brief outline of the character of the ornamental stock in most demand gives us also a good index to the contents of the nurseries. These establishments, which are usually numerous on the outskirts of every considerable town, give little attention to the propagation of fruit trees and berry plants, and, in fact, but few nurseries have any of these. Ornamental stock is all important. They are interesting places to foreigners. It was from these at Tokio, Nagasaki and other open ports that Fortune procured the collections which so enriched the gardens of Europe and America thirty years ago. Evergreens of every kind, but especially conifers, predominate. Of the latter they have a dozen or more species, and scores of varieties, in common culture, trained in many forms. And I want especially to enter a plea for the introduction and more general planting of the numerous dwarf varieties of pines, firs, cypresses and arbor vitæ, and of many other conifers. The leading species may usually be found here, but their varieties are not. They differ much in habit of growth, length of needles and general appearance, and are known by distinctive names. And the same is true of nearly

every other species of plant under culture; the varieties are numerous and usually handsome. Owing to the length of the voyage, cost of transportation and the difficulty of procuring competent persons to make selections, importations are for the most part confined to seed which, of course, does not reproduce the varieties as seen there. The surest way to get what they have that is desirable is to go there and make selections as Fortune did. As an example of what we may yet obtain from there, the Japanese maple may serve as an illustration. Perhaps there are 30 or 40 varieties cultivated here. But a nurseryman at Oji, who grew them largely, told me that he knew some four hundred varieties. Oji is a suburb on the north of Tokio where the nurseries are noted for their collections of maples. Those mentioned, and camellias, azaleas, flowering plums and cherries and some hardy palms (*Chamaerops excelsa* and *Rhapis flabelliformis*), together with a large collection of miscellaneous kinds of less import, constitute the stock of the nurseries.

"The fruit trees, persimmons, pears and grapes, are mostly propagated by the growers themselves. Each of these, too, could contribute to our horticulture. There are already many of the persimmons in America, but so far as I have learned there are none that can stand the winters even in the central states. There are a few kinds which are hardy in the northern part of the main island which might extend the limit of their culture here. Of their pears there is possibly but one variety, the Kago or Mino, which would be considered worth culture here by people in general, though they are all excellent cooking pears; but those which root freely from cuttings would be desirable for stocks, especially the wild species (*Pyrus Ussuriensis*). As for Japanese grapes, they excel our native varieties in all desirable points, and could they be established here would become the leading grape of the country. There is, however, a question of their success here, as they are undoubtedly of vinifera origin.

"Following is a list of desirable trees and plants which Japan can contribute to our horticulture. Some of them are not new, but are still rare; others, and this is true of most of the cultivated kinds, though known in a general way still have many desirable varieties that are strangers to this country, and still others I believe to be unknown to horticulture.

“Flowering cherries (*Prunus Pseudo-Cerasus*, Lindley. Japanese, *Sakura*). Fruit bearing cherries in Japan are rare, and those which may be found there have been imported from America. They have, however, a large number of kinds from the above species, which are extensively cultivated solely for their flowers. They bloom during April and early May, at which season the whole country is gay with the pink blossoms. No garden is so small and poor as not to have its cherry trees. They may be dwarfed and gnarled specimens grown in six inch pots, or they may be stately trees that overshadow the premises, but cherries will not be wanting. We in this utilitarian age and land are apt to look askance at cherry trees that produce nothing but flowers, yet were they known they would surely be appreciated. From modest single pink or white flowers they vary through all shades of red to magnificent double ones two inches in diameter. A few kinds are sweet scented, and at least one kind has green flowers. There must be in the neighborhood of a hundred varieties, or perhaps more, most of which would be an ornament to any lawn. When fully expanded the trees are a perfect cloud of bloom, and some of the double ones remain intact for a month.

“Flowering plums (*Prunus Mume*, Sieb. and Zucc.; Jap., *Ume*, *Mume*). Although they bloom earlier, beginning in Tokio in January and continuing till April, I place these plums second to the cherries, because less magnificent. But still they are unique and greatly admired by the Japanese. They have the advantage of being sweet-scented, and of blooming at a time when they have but few rivals. Like the cherries, the varieties are very numerous, the blooms shading from white to dark red, single and double, large and small. They are grown both as free standing trees and in pots, and being slow growers and easily dwarfed, they are favorites for the latter purpose. The blossoms, even the double ones, are followed by round greenish-yellow plums of the size of the green gage, which, however are not of a high quality. There are probably 50 varieties, many of which deserve to be generally planted for ornament here.

“The double-flowered peach is found in many varieties which I believe to be unknown here. The varieties bloom later than the plums, and more profusely. On some kinds the branches are literally solid spikes of flowers.

"Mematsd pine (*Pinus densiflora*, Sieb. and Zucc.; Jap., *Mematsu*, *Aka-matsu*). This pine is a favorite everywhere. It has many dwarf forms. A common mode of training these is in the shape of a flat or round-headed bush, only a couple of feet high. Another common way of training is as an irregular pyramid, in which each leading branch is spread into a flattened bunch, and these arranged one above the other with intervals of a foot or so. Seen from a distance, trees so trained remind one of stratified clouds on the horizon. Though such methods of training would not harmonize with surroundings here, yet these low pines, allowed to follow their natural bent, would add much to the beauty of American gardens.

"Thunberg's pine (*Pinus Thunbergii*, Parlot.; Jap., *O-matsu*, *Kuro-matsu*). This species has also many dwarf forms which would be desirable acquisitions. And the same remark applies to

"The oriental arbor-vitæ. Some nursery catalogues mention a golden arbor-vitæ, but the Japanese have more than one. I call to mind having noticed at least three; one a good sized, free-growing tree, another of medium size and growth, with branches much flattened, and a third a dwarf, slow grower with bunched branches, apparently a result of the suppressed growth of the leading shoots, all three kinds with bright golden shoots, especially on the south side.

"Other arbor-vitæ are the following: *Thuja obtusa*, Masters; Jap., *Hinoki*, *Kamakurahiba*; also a variety of this named *breviramea*, Jap., *Chabo-hiba*. *Thuja pisifera*, Masters (*Retinospora pisifera*, Sieb. and Zucc.); Jap., *Sawara*, *Shinobu-hiba*. *Thuja Japonica*, Maxim.; Jap., *Goro-hiba*. *Thuja dolabrata*, L.; Jap., *Hime-asunaro*. All these are common forest trees in the mountain regions of the main island, where they grow to great size. They are beautiful ornamental trees, especially the last named, and deserve attention here.

"*Cryptomeria Japonica*, Don (Jap., *Sugi*, *Euko-Sugi*), is another tree which, though no stranger here, deserves wider culture than it receives. It grows to enormous size. At Nikko, for instance, specimens can be found six to seven feet in diameter, a hundred and fifty feet tall and as straight as candles. One of the finest avenues in the country is the road to Nikko, which, for several miles, is closely lined on both sides by these handsome trees. Plantations of artificial forest are also com-

monly made of this tree, and closely planted groves of it can be seen on every hand. It grows wild in the mountains of Akita Ken in the north of the main island, but it does not propagate itself readily, a circumstance from which it is argued that it is an introduced tree. It is, however, easily propagated from seed, which is borne in abundance, and the young plants are very generally used for hedges, being planted very close and trimmed freely. The wood is used for lumber and building purposes and much resembles red cedar.

"*Podocarpus macrophylla*, Don (Jap., *Maki*, *Kusa-maki*), and *Podocarpus Nageia*, R. Br. (Jap., *Nagi*), and its variety *rotundifolia*, Maxim. (Jap., *Maruba-nagi*), are fine tall trees, the first named especially having very large leaves. They thrive well in Tokio, but their habitat is in southern Japan, and they would, probably, not be hardy in the northern states.

"Of the firs may be mentioned :

"*Abies firma*, S. and Z. (Jap., *Momi*); *Abies Veitchii*, Lindley (Jap., *Shirabiso*). Both of these are large forest trees in the north, and are desirable evergreens. The bluish foliage of the latter, with two narrow white lines on the under side of the needles, renders it especially ornamental. They would be hardy anywhere in the United States. Other species might be mentioned, as *A. Mariessii*, Masters; *A. Jessoensis*, S. and Z.; *A. Sachaliensis*, Masters; *A. Tsuga*, S. and Z.

"A couple of magnolias should be mentioned as of special merit, viz: *Magnolia hypoleuca*, S. and Z., Jap., *Ho-no-ki*; and *Magnolia Kobus*, D. C., Jap., *Koboshi*. Both of them grow in the northern island, and would be perfectly hardy in America. The first named, especially, is a magnificent tree. It is of rapid growth and attains a height of 75 feet or more, and the trunk a thickness of two feet. The leaves are obovate, often a foot or more in length, shining bright green and arranged in a close rosette around the flowers on the tips of the branches. It blooms in June, when the strong fragrance of the flowers is carried long distances by the wind. The flowers are some nine inches in diameter, white, with fleshy petals. The fruit is a cone-shaped pod, with red seed. Good judges pronounce it equal in beauty to our *Magnolia grandiflora*, and it has the great advantage of being hardy in the north. I confidently predict that it will meet with general favor as soon as it becomes known here. The wood also has its merits; it is fine

grained and close and takes a brilliant polish. It is much used for carving and inlaid work.

"*Magnolia Kobus* is a somewhat smaller and more spreading tree than the other, and it blooms earlier. It, too, is a desirable ornamental tree.

"The family *Styracaceæ* furnishes two trees which should also be mentioned here :

"*Styrax Japonica*, S. and Z., Jap., *Yego*, *Yego no-ki* ; and *Styrax Obassia*, S. and Z., Jap., *Haku-unboku*. The former is now offered in some catalogues as a new thing. It is a small tree, some twenty feet tall, with rounded head and rather close growth. It is quite common in central Japan. In early summer it produces an abundance of white, pendant, slightly fragrant flowers, somewhat resembling small cherry flowers, and these are followed by gelatinous berries which emit a strong fragrance when crushed. *Styrax Obassia* is a larger and more stately tree, and much the handsomer of the two. It is also less common. In growth and leaf it reminds one of the American linden. The flowers appear in June, in large, upright racemes. They are abundant, quite large, white and fragrant. It is a tree that will meet with favor in American gardens as soon as known.*

"*Albizia Julibrissin*, Boiv. (Jap. *Nemu-no-ki*). This leguminous tree is common in the southern states, but I have also seen it in northern Japan, my attention being particularly attracted to a very handsome specimen in the court yard of the government office at Sendai, in full bloom. The foliage is fine, twice pinnate and the flowers pink, long stemmed and feathery. It blooms in the last of July and beginning of August.

"Another striking tree, which, however, is peculiar to the south, though it can be grown all over the main island, is *Sterculia platanifolia*, L. (Jap. *Aogiri*). It is a rapid grower with few branches, smooth grayish-green bark and very large palmately veined leaves, the leaf stalk being often a foot and a-half to two feet long.

"*Zelkova Keaki*, Sieb. (Jap., *Keaki*). This tree belongs to the nettle family and in foliage somewhat resembles the elm. It is, however, a much larger tree than the elm. The trunk has a smooth light gray bark and it branches rather irregularly. It is, perhaps, the finest deciduous forest tree in Japan. The wood is hard, white, fine grained and is commonly used for

*See Annals Hort., 1889, 105; also introduction list in this volume.

lumber and for every sort of wooden manufacture. It grows to an enormous size; trunks six feet thick are not rare and it is tall in proportion. It has open cymes of small bluish or purple flowers, but the beauty of the tree lies chiefly in its majestic appearance.

"Of the many species of oak indigenous to Japan I shall mention only *Quercus cuspidata*, Thunb; Jap., *Shii*, *Shii-no-ki*. It is an evergreen oak largely used for hedges and ornament in Tokio. It would probably be hardy anywhere south of Washington. The leaves are two-ranked, shining dark green, long, rather narrow, dentate and pointed, as the name indicates. Its small acorns are peddled on the street and eaten like nuts, having no bitterness or astringency whatever.

"Among shrubs, one of the most common in Japanese gardens is *Nandina domestica*, Thunb. (Jap., *Nanten*), of which there are many varieties under culture. It is an evergreen bush with rather large, shining, dark green pinnate leaves and slender upright branches. Old bushes are some eight feet tall. The flowers are not conspicuous, but they are succeeded by large persistent clusters of bright red or white berries, which add greatly to the beauty of the plant. It would probably be hardy as far north as Maryland. The varieties differ in size of leaf, habit of growth and color of berries. *Photinia glabra*, Maxim (Jap., *Kaneme-mochi*). A handsome evergreen bush or small tree, with dark green, rather large leaves and pretty white flowers resembling those of the privet. The young leaves are purple, which gives the bush a peculiar appearance in spring. It is much used for hedges and ornament. In this connection it might be mentioned that *Camellia Japonica*, the single flowered camellia, grows wild in central Japan where I have often seen trees thirty feet high and the trunk a foot thick. This wild species would doubtless be hardy over a considerable portion of the United States and would add variety to the shrubbery wherever it can thrive. The innumerable varieties, both single and double, are grown both in pots and as garden shrubs. *Enkianthus Japonicus*, Hook. (Jap., *Dodan tsutsugi*) is a handsome deciduous shrub belonging to the heath family, which is well worth introduction. It is wild over a large portion of Japan, and would probably be hardy in the Middle States. Its leaves turn a brilliant scarlet early in the fall, and on this account is much

grown for ornament and hedges. The flowers are not showy. *Lindera sericea*, Blume (Jap., *Kuro-moji*). A deciduous shrub belonging to the laurel family, which is worthy of culture. Its leaves somewhat resemble those of the syringa. The wood is fragrant and is commonly used for tooth-picks. *Zanthoxylum piperitum*, D. C. (Jap., *Sansho*); *Z. schinifolium*, S. and Z. (Jap., *Inu-sansho*); *Z. ailanthoides*, S. and Z., (Jap., *Karasu-sansho*); *Z. planispinum*, S. and Z. (Jap., *Fuyu-sansho*). Are all hardy, fragrant shrubs well worth culture. They are all more or less thorny, especially the last two, which also grow to the size of small trees. Varieties of the first named are grown for the seed and for ornament, and some of them are thornless. *Ilex crenata*, Thunb. (Jap., *Inu-tsuge*), is a box-like evergreen bush of much beauty, and it is worth culture. *Lespedeza bicolor*, Turcz., Jap., *Hagi*, *Yawa-hagi*, is a half-woody shrub much grown for ornament, and is also abundant wild. It sends up from the roots slender, willowy shoots, clothed with feathery foliage and small purple pea blossoms all summer long. It would probably be hardy everywhere in America. Several other species of *lespedeza* are good fodder plants.

"Vines. *Vitis inconstans*, Miq. (Jap., *Natsu-Zuta*, *Tsuta*.) It seems probable that this very handsome vine, which is so common in Japan, has already found its way to this country, but if so, I have failed to learn the fact. It is a woody vine, which climbs by tendrils like the Virginia creeper, and clings tenaciously to all objects of support, whether trees or buildings. It is found in abundance in groves and woods everywhere in central Japan, and I think it would be hardy anywhere in America. The leaves on the young wood are small, those on older wood large, impressing the casual observer with the idea that there are two distinct vines. In shape they remind us of the grape leaf, and they are so numerous as to form a thick carpet on the wall. Early in the fall the vine turns a brilliant scarlet. It is the handsomest vine for covering buildings that it has been my privilege to see. *Akebia lobata*, Decaisne (Jap., *Mintsba-akebia*). This species of the *akebia* is not known to American horticulture. It is a stronger grower than *A. quinata*, and I believe hardier. It is common in the mountains of northern Japan, where I have seen some very large vines. The leaves have but three leaflets, and are

larger than those of *A. quinata*. The fruit is like that of the latter. It climbs by twining. *Actinidia volubilis*, Planch. (Jap., *Shirakuchi-zuru*). *Actinidia polygama* is known here, but I believe the above species to be a stranger to this country. It would be hardy anywhere in America, as it is indigenous to the island of Yezo. It climbs to a height of 70 or 80 feet, and may be suited to arbors. In appearance it resembles *A. polygama*. *Schizophragma hydrangeoides*, S. and Z. (Jap., *Yuki-kazura*, *Iwa-kagami*, *Uchi-wagi*). This beautiful climber has already been introduced, but it is not known as well as it deserves to be. In some portions of the mountain forests of central Japan nearly every tree is covered with it. It climbs up the straight trunks of the cryptomeria, and when it blooms in July and August, the trunks from top to bottom are studded with the large bunches of its odd white flowers. *Kadsura Japonica*, L. (Jap., *Sane-kadsura*), is another wood-vine of much beauty. It grows chiefly in the south. It climbs by twining the slender branches about the objects of support, and would be suited to verandas and arbors in sheltered positions. The foliage resembles that of the so called madeira vine."

§ 3. *PLANT DISEASES AND INSECTS.*

Plant diseases were unusually prevalent and serious during 1890, and insects were about normal in numbers and destructiveness. Among fungi, attention was particularly drawn to the apple scab, especially in New York, as it was supposed to be responsible for much of the apple failure. Grape diseases were also serious, and for the first time the mildew and rot invaded the vineyards of western New York to an alarming extent. A new grape disease has also occasioned much alarm in California, and a new trouble has arisen in western New York. The New York disease fortunately bids fair to submit to such treatment as thorough under-drainage and careful culture, but the disease invading the Pacific coast is yet wholly obscure. The New York disease is known as rust or blight, and is indicated by a browning or shrivelling of the leaves and the consequent death or retardation of the fruit. The injury first appears as small reddish or brown discolorations between the veins. So far as known, the trouble is a physiological one, apparently due to cold and insufficiently drained soil, and it was probably brought on, or at least augmented, by the excessive rains of 1890.*

But experimentation has kept pace with the difficulties, and it has been proved beyond all doubt that many of our worst diseases and insects can be kept in check profitably by the use of sprays. Grape growers in all the best grape regions are adopting the copper sprays, and many orchardists are treating apples, pears and other fruits with good success. In most parts of the country the growers are following closely upon the experimenters in the application of fungicides and insecticides. So great has become the general interest in the subject that growers in several states are asking for the enactment of laws looking to the control of plant diseases and insects. It is only a question of a short time until nearly every state will add this important labor to its government machin-

* See Journ. Mycology, vi. 95.

ery. Laws for the suppression of peach yellows exist in Michigan, Ontario, New York, Virginia and Delaware, although in the last state the law applies only to the southern half of the state. New Jersey has a law, which was approved in May, for the suppression of any new diseases which may enter the state. It is entitled "An act to prevent the spread of fungous diseases of plants," and is as follows:

"When the officers of the State Agricultural Experiment Station shall discover any new fungous growth which is doing injury to plants or vines, and while the same is confined to limited areas, they are hereby authorized and empowered to enter upon any lands bearing vines or plants so affected, and destroy the same by fire or otherwise, as they shall deem best.

"Any damage to private property resulting from the operation of destroying the said fungous growth by the officers of the state, shall be certified to by them, and the amount of damage paid to the owners thereof, from the same fund and in the same manner as is paid to owners of diseased animals killed by the State Board of Health.

"Expenditures under this act shall not exceed one thousand dollars in any one year.

"This act shall take effect immediately."

The most signal legislation of the year, however, is that directed against the gipsy moth (*Ocneria dispar*) in Massachusetts. Public attention was first called to this insect by Professor Fernald in a special bulletin of the Massachusetts Hatch Experiment Station in November, 1889. The gipsy moth appears to have been introduced into Medford twenty years ago by L. Trouvelot, who was conducting experiments upon silk culture. The insect escaped from him, and subsequently spread rapidly. In Europe the insect is regarded as a great pest, for it is an omnivorous feeder. The state enacted a law aiming at its destruction, and appropriated \$50,000 for the purpose. The first commission was a political one, and little was accomplished, but the Governor dismissed it and appointed new commissioners, selected from members of the State Board of Agriculture. It is not yet determined if the insect can be exterminated, but the venture is an important one to the whole country, because it will indicate the extent to which we can hope for relief from insect depredations through laws. J. G. Jack writes, in *Garden and Forest*, that

"the appropriation and expenditure of \$50,000 already voted, however, will not have been altogether in vain; for, besides the accomplished temporary suppression of the pest, a widespread popular interest in entomology has been aroused, and the value of a knowledge of such things has been once more very effectually and practically demonstrated to those who usually belittle such studies." The legislation in both New Jersey and Massachusetts was the result of inquiries conducted by experimenters of the respective states, and it is an illustration of the influence which experiment stations are already beginning to exert.

The larger part of the experimentation of the year in economic mycology and entomology has been that of perfecting the means and materials for spraying plants, and much of the best efforts of the next few years will probably be expended in the same direction. The year has marked the advent of several new pumps, particularly of the knapsack pattern; the ammoniacal solution of carbonate of copper has superseded the Bordeaux mixture in general favor, and initial experiments have been made in the combination of fungicides and insecticides and in the exact relations of the arsenites to injury of leaves. Exact reference to all the experiment work of the year will be found in the "Register of Experimental Horticulture" in Part II.

Plant diseases. The gist of the year's results in plant diseases is given for this occasion by D. G. Fairchild of the Division of Vegetable Pathology of the national Department of Agriculture:

"The importance of investigating the diseases of our crops is becoming more and more apparent as our knowledge on the subject increases. To the older inhabitants whose memories stretch back into the days of sure crops and bounteous harvests, the successive failures and multiplication of plant diseases may well raise the question of what these plant parasites are, where they come from and into what straits they must inevitably drive the horticulturist of the future. That the fungous diseases of plants have increased during the past few years there is no more reason to doubt than that the weeds of the gardens have grown and spread their seed from field to field. The two cases are analogous. From the beginning of husbandry the attention of farmers has been called to the neces-

sity of thorough weeding, yet, with all the care given, many farms are almost ruined by noxious weeds. Is it any wonder, then, when it is considered that the study of plant diseases is only a few years old and that few attempts have been made to combat injurious fungi, that orchards, gardens, and greenhouses are filled with these tiny parasitic weeds, visible only by the aid of the microscope? These minute fungi which grow upon the living parts of our cultivated plants and send their roots, or vegetating threads, deep into the leaf or stem, instead of into the moist earth, have probably been here as long as the oaks or poplars, and the fungus causing the grape vine mildew has just as much right to be considered an old inhabitant of the globe as the vine upon which it lives. The maladies of plants, like the plants themselves, are migratory, and we must expect to find new diseases in our greenhouses and orchards just as much as new weeds in the garden. While it may be said that this tendency to spread or migrate may explain in part the apparently sudden appearance of these diseases, the main reason is that we do not notice them when they first begin their work. The average farmer or fruit grower passes, unnoticed, hundreds of fungous diseases of his growing crops ascribing causes of 'the weather' or 'too much rain' for their sickly appearance.

"If these lower plant forms are looked upon as weeds, it will not be wondered at that there should be found in one year hosts of new forms, some of which are living upon cultivated plants and are hence of interest to cultivators. Thus in a New Jersey cranberry bog a new fungous disease has been found which forms upon the cranberry stems and leaves thousands of bright rose-colored galls or swellings, checking the growth of the plant and preventing fruiting.* Because of the pronounced habit of the fungus of swimming from plant to plant and bog to bog, it has seemed advisable to destroy by fire the whole infected region to prevent the spread of the trouble. The disease has been named the cranberry gall fungus (*Synchytrium Vaccini*, Thomas) and is so described that any one will be able to recognize it. In Connecticut Dr. Thaxter has discovered a new and destructive rot of the lima bean, caused by a new species (*Phytophthora Phaseoli*), allied to the potato rot fungus,† which, if allowed to spread, may

* Bull. 64, New Jersey Ex. Sta.

† Annual Rep. Conn. Ex. Sta. 1889. Jour. Mycology U. S. Dep. of Ag. Vol. vi. No. 11.

check materially the growth of that crop in America. Among the hollyhocks of New York greenhouses a destructive malady (*Colletotrichum malvarum*) has been at work which has already made great inroads, in some cases stopping entirely the culture of this flower, and which, as will be noted later, has been placed, through the efforts of the division of vegetable pathology, successfully under control. Almost every scientific publication on the subject, and nearly every bulletin from the experiment station botanists, announces the discovery of some new disease of economic importance. Two entirely new maladies of spinach in New Jersey have threatened the growers with disaster and called forth an excellent bulletin* on the subject by Dr. Halsted. The discovery in France by Prilleux and Delacroix of a destructive germ disease of potato and pelargonium stems, the simultaneous rediscovery of the cucumber mildew from Cuba in America and Japan, are both points likely to prove of importance before another year.

"That mysterious and as yet imperfectly known disease of the California vine, the scourge of the region, has refused as yet to be crowded into the category of bacterial or germ maladies, although studied both in its home and among the hills of Sicily and Algeria by N. B. Pierce, agent of the division of vegetable pathology. The malady resembles the *folletage* of the French vineyards and for the present it must be placed, together with the new malady of western New York, with the imperfectly understood diseases awaiting further investigation on both sides of the Atlantic. The appearance in Kansas and Georgia of a striking peach disease called peach rosette and considered by Dr. Erwin F. Smith as only a form of the yellows, reinforces anew the importance of the investigations into this mysterious malady which promises more this year than ever before to be identified as a specific germ disease. Aside from these newly discovered diseases there are the old troubles, which although well known by name, are but imperfectly understood.

"The fungus of the strawberry leaf-spot or rust, which ruins hundreds of strawberry beds yearly, has been traced in the laboratory of Cornell University through its winter growth, and the reason why it is profitable to collect and burn the

* Bull. 70, New Jersey, Exp. Sta.

leaves in the fall or winter is as evident now to the pathologist as that weeds killed before they seed will diminish the next year's weed crop.

"The onion smut, which has diminished the profits of onion growing in Connecticut, has been so well worked out by Dr. Thaxter* that the intelligent farmer with the facts before him can scarcely fail to make this crop a success. By simply sowing the seed in drills along which has previously been scattered a mixture of equal parts of air-slaked lime and flowers of sulphur, the fungus which enters the onion seedling beneath the ground is immediately checked.

"The cranberry scald, which yearly ruined hundreds of bushels of this most profitable crop, and which not long since was attributed to such indefinite causes as unfavorable atmospheric conditions, has been so successfully studied at the New Jersey Experiment Station that systematic and perfectly intelligent attempts are in progress against the trouble.

"The potato scab has attracted unusual attention this year and at least two kinds have been described. One, discovered by H. L. Bolley of Indiana,† is caused wholly by the attacks of a germ or one-celled organism of extremely minute size, known as a *bacterium*, which enters the young growing tuber, and by rapid growth in the cells beneath the skin, breaks down the tissue and forms, upon the maturing of the potato, the deep, ugly pits so well known. The other, equally well described by Dr. Roland Thaxter in a paper at the meeting of Agricultural Colleges and Experiment Stations, resembles the former in appearance almost precisely, and is the result of the action of a fungus which is found abundantly upon rotting manure, and is closely related to the moulds. These discoveries, together with that of the German investigator who finds a very low form of plant life, a slime mould, as the cause of the malady, give us a deeper insight into the hitherto somewhat mysterious affection, and form a basis for intelligent practical experimentation. From these recent discoveries, the contagious nature is fully settled and the danger of planting scabby tubers, or employing lime, ashes, or especially stable manure, in excess is pointed out.

*Ann. Report Conn. Exp. Station, 1889.

†Agric. Sci. 243, 247.

“Turning now to the question as to what progress has been made in the matter of treating these various troubles about which so much is already known, we have only to point to the almost universal success during the season in the treatment of pear leaf-blight, pear and apple scab, black-rot of the grape and blight or rot of the potato and tomato. In the minds of investigators there is no doubt as to the effectiveness of the copper compounds, carbonate or sulphate, in the treatment of such superficial diseases as pear or apple scab. The experiments the past year in Michigan, Wisconsin and Maryland point strongly to the necessity of early treatment, and although another season is necessary to prove fully the truth of the statement, three sprayings before the fruit is half an inch in diameter will in all probability protect the fruit from the disease. Later treatment will probably be unnecessary, and, judging from the trials this year, are likely to prove corrosive in their effect upon the skin of the pear and apple. The pear leaf-blight has for several years defoliated the orchards of both this country and Europe, but is now subject to the will of every fruit grower who uses the means at his command. The solutions most profitable in its treatment, judging from the year's experiments, are the ammoniacal copper carbonate solution (3 ounces of the carbonate to one quart of the ammonia and 22 gallons of water) and the well known Bordeaux mixture.* Three sprayings with either of these solutions will undoubtedly preserve the foliage intact. The mildews of the grape vine have received their usual attention, especially in Italy and France, during the past year, the question considered being simply new modes of cheapening the labor of application.

“The discovery above mentioned of a promising remedy for onion smut, the successful treatment of the hollyhock anthracnose in the greenhouses of Peter Henderson with the Bordeaux mixture, the prevention of the mignonette leaf spot by the same remedy, and the highly satisfactory experiments in this country and France toward checking, economically, the ravages of potato blight, all show the interest that is being aroused on the subject of remedies for plant diseases. The question of economy, which has until recently prevented

* Six pounds of copper sulphate, 4 pounds of lime and 22 gallons of water.

many from attempting to combat the black-rot of the grape, has been settled during the past year in a neglected vineyard of Virginia. Here the Bordeaux mixture yielded as net gain for a total outlay of \$6.51, \$25.89, or 297 per cent. upon investment; the ammoniacal solution of copper carbonate, above mentioned, yielded for an expenditure of \$3.32, \$22.60, or 685 per cent. upon the outlay, while, where no sprayings were made, no grapes whatever were gathered.

"The new realization that, unless these fungous pests are fought, there will be no profit in fruit growing and truck gardening has created a demand for cheaper and less complicated machinery with which to apply the various fungicidal mixtures, and this demand has been promptly met by the manufacture of various knapsack pumps, two of which are shown in 'Tools and Conveniences of the Year,' in Part II. One introduces a new material into the construction of such machinery, in the shape of indurated fibre-ware. This ware possesses the advantage of being strong and light, and promises to be even more durable than copper, should the demand for the pump ever place it fully upon the market. The Galloway pump was devised by B. T. Galloway, with the view of putting upon the market a cheap and, at the same time, durable knapsack sprayer. It has several advantages of simplicity and ease of manipulation. Since no patents are upon it, any copper manufacturer may construct it and may secure figures and a description of its construction by applying to the Department of Agriculture.

"Aside from this, the matter of the manufacture of a more convenient fungicide, or a more convenient form of the old tried formulas, has attracted some attention, and the firms of Peter Henderson & Co. of New York City, Benj. Hammond of Fishkill-on-the-Hudson, W. S. Powell & Co. of Baltimore, E. Bean of Jacksonville, Fla., and perhaps others, have taken the matter into consideration and we may expect soon to see commercial fungicides, as well as commercial fertilizers, put up in the most convenient form for immediate use. The progress of the year, while it has not revealed any entirely new fungicides, has tested old ones and suggested most valuable modifications and combinations, such as that of the Bordeaux mixture with the arsenites in the treatment of apple scab and codlin moth. The only modification worthy of notice here is that discovered by M.

Perret of France, which consists in adding to a 2 per cent. mixture of copper sulphate and sodium carbonate in the proportion of one to three, one-twentieth of a part of cheap molasses. Should this fungicide prove to be what it promises, it will supersede the old and well known Bordeaux mixture of copper sulphate and lime, and greatly reduce the cost of the treatment of plant maladies.

"But if an index of progress is looked for only in the scientific facts discovered, or the application of these facts to the needs of the fruit grower or gardener, a misconception of the state of affairs may occur. Ten years ago few would have believed that any state would legislate against such things as pear blight, peach yellows or black-rot of the grape, yet in 1890 New Jersey framed a law which provides for the destruction of all plants affected by new diseases which are considered dangerous to the agriculture and horticulture of the state, and for the reimbursement of the owner from the state treasury.

"A project is now on foot to connect in an international association all economic vegetable pathologists, or students of plant diseases. Should such a plan be consummated nothing but good can result, as it will furnish the long looked for intercommunication between American and European investigators which is so much needed.

"In conclusion, it may be said that one of the most promising indications of future good to be accomplished by the investigations of plant diseases is the constantly increasing interest manifested in the work by practical men. Everywhere there is a demand for more light on such matters and it is only a question of time when this subject will be as thoroughly understood as ordinary matters connected with the growing of crops."

The treatment of grape mildew at the School of Agriculture at Montpellier, France, in 1890, is told by George Bencker in *Le Progres Agricole*:

"The national school of agriculture at Montpellier has this year continued its experiments with the various preparations used to prevent mildew on the grape. The materials were applied to two plats of vineyard which had been used during preceding years for experimentation; one plat received liquid treatment, the other was treated with powders. The plats were divided into squares for the use of the various pre-

parations. The following table shows the amount of each preparation used :

Bordeaux Mixture.....	{ 2 k.* sulphate of copper.....	{ to 1 hect.† of
(<i>Bouillie bordelaise</i>) ..	{ 2 k. slacked lime.....	{ water.
Verdet.....	{ 1 k.	{ to 1 hect. of
(<i>Dibasic acetate of copper</i>)		{ water.
Improved Bordeaux Mixture	{ 1 k. sulphate of copper ..	{ to 1 hect. of
(<i>Bouillie bordelaise cteleste</i>)	{ 5 k. sugar.....	{ water.
	{ 5 k. aluminium calcide ...	
	{ 1 k. slacked lime.....	
Bordeaux Mixture and spori-	{ 1 k. sulphate of copper..	{ to 1 hect. of
vore (<i>Glue</i>).....	{ 1 k. slacked lime	{ water.
	{ 1 k. sporivore.....	
Mixture of carbonate of soda	{ 1 k. sulphate of copper..	{ to 1 hect. of
and sulphate of copper.	{ 2 k. crystals of soda	{ water.
Gelatinous hydrocarbonate of	{	{ to 1 hect. of
copper (<i>Hydrocarbonate</i>	{ 1. 5 k.....	{ water.
<i>de cuivre gelatineux</i>).....		
Aluminium mixture, without	{ 1. 73 k. chloride of calium	{ to 1 hect. of
copper	{ 3. 7 k. alum	{ water.

Check square, no application.

“Mr. Duchein, who conducted the experiments, made three applications to each square :

The first application.....May 21, 1890.

The second application June 2, 1890.

The third application.....July 25, 1890.

“The following powders were used upon the squares of the second plat, one kind to each square : Shawinski’s powder, Shawinski’s sulphur, cuprosteatite, sulfosteateite, sulfocyanide of copper, sulphated verdet (*soufre au verdet*), hydrated sulphate of copper (*soufre a l’hydrate de cuivre*), sulphated sulphur (*soufre sulfate*), cupro-phosphate (*cuivro-phosphate*), sulphur and cupro-phosphate (*soufre au cuivro-phosphate*).

“These squares received four applications :

The first application.....May 20, 1890.

The second application June 2, 1890.

The third application.....June 23, 1890.

The fourth application July 25, 1890.

“Since the mildew did not appear in the squares this year, the relative merits of the substances used cannot be estimated, except in regard to the length of time in which they remain effective.

* Kilogram or kilo. 1 k. = 2. 2 lbs.

† Hectolitre, = 26. 4 gals.

"Among the powders, the sulfosteatite and the cuprosteatite proved to possess the greatest adherence, and consequently, in case of an attack they would have protected the vines longer than the other substances. The principal ingredient of these powders is talc, which, when dry, has the greatest adhesive power. But while the sulfosteatite naturally contains only 10 per cent. of sulphate of copper, the cuprosteatite has 15 per cent. in the form of hydrate of copper, and consequently it cannot burn, as sometimes occurs with the sulfosteatite.

"We have frequently called attention to the danger of using substances containing soluble sulphates. The danger is increased when the powders contain sulphate of copper in a natural state, however finely divided. When a drop of water dissolves one of these particles a concentrated solution is immediately formed and this has an exceedingly caustic action.

"The squares upon which the liquids had been applied received the last application July 25. The summer rains soon washed away all traces of the Bordeaux mixture and shortly afterwards of the other materials also, excepting two. The mixture of carbonate of soda and sulphate of copper resisted the action of the weather admirably, but the stains of verdet showed plainly upon the leaves even after they had fallen in November. Like results have been obtained wherever the verdet has been tried, and thousands of acres have been treated with it. This property of the verdet is of prime importance, for we are thereby enabled to make fewer applications and these retain their efficacy for an indefinite period. Three applications were made, in order to reach the later growths of the vine.

"The above observations have led Mr. Duchein to arrange the liquids in the following order, based upon the length of time during which they remain effective:

- "1. Verdet.
- "2. Carbonate of soda and sulphate of copper.
- "3. Improved Bordeaux mixture.
- "4. Sulphocyanide of copper (liquid).
- "5. Eau celeste.
- "6. Gelatinous hydrocarbonate of copper.
- "7. Aluminium mixture.
- "8. Bordeaux mixture and sporivore.
- "9. Bordeaux mixture.

“Powders. Although it is advisable to use liquids when possible, those who find this method of treatment impracticable will obtain good results with powders, especially cupro-steatite. In the powder cupro-phosphate, the sulphate of copper is in the form of a hydrate, and thus cannot burn. The phosphate of lime, in which this oxide is found, is also a fertilizer for grapes; certainly this is an advantage, but is it not to the detriment of the adhesive quality? We must not lose sight of the fact that we are trying to destroy the mildew; the mixed powders (sulphate and the salts of copper), designed to guard against the oidium and the mildew, are not very successful. It is better to combat the diseases separately, although at the national school last year the sulphur of Skawinski was found more effective against mildew than Skawinski's powder. Plainly here was an anomaly.

“Liquids. This year Mr. Duchein wished to try a fungicide having aluminium for its essential ingredient instead of copper. It is composed of 2 k. of alum to 1 k. of chloride calcium, used in the proportion of $5\frac{1}{2}$ k. to a hectolitre of water. Since the mildew did not appear, the value of this compound could not be determined, but there is little reason to believe that it would prove more valuable than the *bouillie biterroise* which contains no copper and which was not used at all this year, as it has been found to be worthless.

“The gelatinous hydro-carbonate of copper would have been better than the preceding, but in regard to adherence and durability it is far from being equal to the carbonate of soda and sulphate of copper.

“Sporivore is a glue which is added in the proportion of 1 k. in a hectolitre of water to a Bordeaux mixture consisting of 1 k. of sulphate of copper and 1 k. of lime. This material is still less adhesive than the hydrocarbonate; besides, when applied, it covered the leaves with an impermeable coating, so that they drooped from want of air. But fortunately this was washed off and growth recommenced.

“This proves the error of those who wish to make the Bordeaux mixture more adhesive by adding some substance such as gelatine, gum, glue, etc. Adhesion should be obtained only by means of soluble salts which recrystallize on the leaves in the form of a tightly fitting net.

“In 1887 we maintained that a solution of verdet is and

always will be the available form in which copper will be most effective against mildew, and this solution alone fulfils all the necessary conditions, viz :

“1. Absolute certainty of never burning, whatever the amount applied.

“2. Ease of preparation.

“3. Solution obtained without the addition of any other substance.

“4. Copper dissolves without the addition of any other substance.

“5. The ease with which the substance remains in suspension.

“6. Immediate destructive action against mildew.

“7. Complete adherence to the leaves.

“8. Indefinite preservation.

“9. Natural richness in the hydrate of the binocide of copper.

“10. Cheapness.

“11. Required number of applications as small as possible.

“One of the failings of the Bordeaux mixture, and of the carbonate of soda and sulphate of copper, is that they do not contain sufficient dissolved copper. This defect might be remedied in the laboratory but it is impracticable to do so in the field. Sugar and lime have been the principal agents used for this purpose, giving rise to two classes of fungicides—those prepared in the laboratory, and those made by the grower. The preparation of either kind is difficult and expensive. The same results do not always follow the use of the same proportions of the ingredients. Sometimes more and sometimes less lime is required to exactly precipitate all the sulphate; and again a certain amount of sugar does not always dissolve a corresponding amount of the oxide. Nor does the preparation retain a uniform strength. Its action grows weaker so that only the amount to be used immediately should be prepared. A still more serious objection is, that the amount of lime or soda used to neutralize the acid may not be sufficient, and consequently the valuable sulphates remaining would, when applied, seriously burn the foliage.

“In the improved Bordeaux mixture the most difficult operations have already been made. One admirable quality is the ease with which it remains in suspension. Its cost is about 45 cents per hectolitre. In regard to adhesion and durability

it ranks third. But by analysis it was found to contain a large proportion of free soluble sulphates, and consequently there is a manifest possibility of its burning the foliage, especially if the solution on the leaves is concentrated by several applications, or by the carelessness of the operator. If more lime is added it unites with the sugar and is a total loss, and still the solution may not be completely saturated.

"The name improved Bordeaux mixture could more appropriately be applied to a preparation, the formula of which has been given by Mr. Duchein. It combines the merits of the Bordeaux mixture and the eau celeste. Mr. Duchein prepares the Bordeaux mixture according to the formula already given, but uses as little water as possible. The lime is in excess and this facilitates the operation. Then he adds as little ammonia as possible, just enough to obtain a blue coloration in the supernatant liquid. All that is then necessary is to add sufficient water to produce a hectolitre of the liquid. This is a simple and cheap preparation, and perhaps the only objection to it is its want of adhesive power."

Insects. Some of the most important results of the year in economic entomology have been collated for me by Professor J. B. Smith of the New Jersey Experiment Station :

"The plum-curculio was one of the favorite subjects of investigation during the year, Ohio, Michigan, Iowa and New Jersey having devoted considerable attention to it. In Ohio, Weed carried on his plum spraying experiments 'under ordinary commercial conditions,'* spraying one-half of an orchard of 900 plum trees, and jarring the other. The result was extraordinary. Of the sprayed trees not more than 3 per cent. of the fruit was injured ; of the jarred trees not more than 4 per cent. There is no statement of what neighboring orchards were like, and this record stands in strong contrast to the results attained by Gillette and Cook. Cook, after strongly recommending the arsenites for the curculio,† tried his own recommendations most thoroughly, and with a most deplorable lack of success.‡ Although treated in the most careful manner, every plum on the sprayed trees was injured. He adopts now the rather startling theory that the curculio is a friend, because it

*Bull. 8, vol. iii. Ohio Exp. Sta.

†Bull. 53, Mich. Exp. Sta.

‡See a thorough discussion of arsenites for the plum curculio in *Annals Hort.* 1889, 63.

prevents over-bearing, and he suggests planting plum trees in apple orchards to prevent injury to the apples. Webster has reported* the results of his experiments in breeding curculios on different varieties of apples and plums, and concludes positively that plums planted among apple trees do not protect the latter. As with many other species, it is probably a question of the number of insects; when numerous enough they will take every fruit suitable to their purpose. When comparatively scarce, they may exercise a choice. Gillette reports† as the results of his studies, that the curculio prefers the imported to the native varieties of plums, 48.8 per cent. of the former and only 6.6 per cent. of the latter being infested. He also reports that he found spraying an excellent remedy, although not applied under the best conditions. He has since repeated his spraying experiments under the best possible conditions and reports absolute failure. The sprayed trees were more infested than the unsprayed checks. Green, who tried spraying with arsenites in Minnesota‡ again reports the most gratifying success. It is evident from these contradictory experiences that spraying is far from being a satisfactory and reliable remedy for the injuries of the plum curculio. The special circumstances that produce success in the one case and failure in the other, are still beyond our ken.

“J. B. Smith has made some experiments in a different line. § He finds that the insects will not develop in growing apples, while in dropped fruit, almost every egg-puncture was represented by a full-grown larva later on, provided the apples were allowed to decay. When decay was prevented by keeping the fruit absolutely dry, none of the larvæ developed. As a consequence, he strongly urges the systematic gathering and destruction of all fallen fruit as the best way of preventing the maturing of the species. Nine full-grown larvæ were found in a single apple, and the destruction of all such fruit must do much to lessen the numbers for the following reason.

“All of the publications confirm the statement that there is only a single annual brood of the curculio, although egg laying extends to the end of July, or even later.

“Gillette has also studied the plum-gouger (*Coccotorus pru-*

* Insect Life ii. 305.

† Bull. 10, Minn. Exp. Sta.

‡ Bull. 9, Iowa Exp. Sta.

§ Garden and Forest. Nov. 19, 1896.

nicida), a species which ranks close to the curculio in destructiveness, and he finds that this prefers the native varieties, more than 27 per cent. of the fruit being infested. Spraying is of no value in this case, and jarring to collect the beetles is recommended. The infested fruit does not drop, and gathering it before August 1 is recommended to prevent maturing the larvæ.

"Miss Ormerod* in her thirteenth report describes an attack by the "pear blight beetle" of American writers, (*Xyleborus dispar-pyri*) on plum, in some parts of England. She suggests trapping by placing poles among the trees, on the theory that dead or dying wood will exercise a superior attraction, and then recommends burning these traps before the insects mature. This is only another application of the method adopted by the German foresters to protect growing trees from the ravages of others of the bark borers (*Scolytidæ*). Badly infested trees should, of course, be cut and burned.

"Weed gives us† a description of all stages of the cherry louse (*Myzus cerasi*), but adds nothing to our knowledge of remedies. Smith treats the same insect,‡ and recommends kerosene emulsion or fish oil soap as destructive agents.

"The cherry slug (*Selandria cerasi*) has been injurious to both pear and cherry in Nevada, and Hillman§ recommends tobacco, hellebore and buhach, all of which were tried and found successful.

"Peach insects received comparatively little attention. Erwin F. Smith has given|| a very complete description of the peach louse (*Aphis persicæ-niger*), a new insect, and an account of its depredations in Virginia, Maryland, Delaware and New Jersey. He discusses its habits at considerable length, and thinks that much of the injury to the peach, usually called the yellows, may be due to this insect. He suggests no remedies for the underground form, but has since found¶ that tobacco dug into the ground around the tree is satisfactorily. The true yellows, however, is not to

*Report of Observations of Injurious Insects and Common Farm Pests during the year 1889. London, 1890.

† Bull. 2, vol. 1. Ohio Exp. Sta. Technical Ser.

‡ Bull. 72, N. J. Exp. Sta.

§ Entomo. Amer. vi. 101-201.

|| Bull. 10, Nev. Exp. Sta.

¶ Bull. 75, N. J. Exp. Sta.

be confounded with this injury. J. B. Smith has treated of the same insect,* and recommends potash in the form of kainit as most satisfactory, acting both as a fertilizer and insecticide. For the ærial forms, whale oil soap is recommended. Later, he repeats E. F. Smith's recommendation of tobacco for underground forms.

"The peach tree borer has also been treated by J. B. Smith,† who recommends mechanical means, wrapping the base of the tree with upright straw or newspaper, to prevent oviposition, or destructive means by pouring diluted kerosene emulsion around the base after removing the top soil.

"Alwood, of the Virginia station, related at the meeting of the economic entomologists in November, that painting the trunk with ordinary white paint to which a little Paris green is added is a perfect protection. Of course, all these applications must extend for a depth of at least six inches below the soil to be effective.

"Apple insects have received the usual amount of attention. Spraying for the codlin moth larvæ was practiced at several stations, and uniform success is reported. There is no longer a doubt that we have a safe and reliable remedy for the injuries done by this insect.

"Weed has studied the oyster-shell bark louse (*Mytilaspis pomorum*) and the scurfy bark louse (*Chionaspis furfurus*) and recommends‡ scrubbing trunk and branches with carbolic mixture, 1 pt. crude carbolic acid to 7 parts of a solution made by dissolving 1 qt. soft soap or ¼ lb. hard soap in 2 quarts boiling water.

"The buffalo tree hopper (*Ceresa bubalus*) has proved injurious in Ohio by puncturing twigs and branches for ovipositing and for this, the kerosene emulsion, used after the young insects have made their appearance, is recommended.

"In New Jersey, muriate of potash in water, used to wash tree trunks, has proved effective in destroying the scurfy scale. §

"Apple plant lice were also reported on by Hillman, || who recommends for the leaf lice the standard preparations of kerosene and tobacco, and for the root lice (*Schizoneura lanigera*)

* Bull. 72, N. J. Exp. Sta.

† Bull. 4, vol. iii, 2, sec. Ohio Exp. Sta.

‡ Bull. 11, Nev. Exp. Sta.

§ 2d Ann. Rept. N. J. Exp. Sta.

|| Bull. 75, N. J. Exp. Sta.

suggests that the same application be made in a trench around the base of the tree.

"From New Zealand comes the statement * that soot, buried 6 or 7 inches deep under infested apple trees, rids them of this same woolly-aphis, the 'American blight' as they call it.

"In Miss Ormerod's report a number of apple pests are treated, none of which are of particular interest to American horticulturists save the bud-moth (*Tmetocera ocellina*) for which no satisfactory remedy is suggested. This is interesting, because Harvey stated at the meeting of the economic entomologists in November that this insect had attacked the terminal buds of the blackberry in Maine, an entirely new habit for this species.

"Harvey has also studied the 'railroad worm' (*Trypeta pomonella*) in Maine. His results are not yet published, but we understand that gathering and destroying the infested fruit is recommended as the most practical remedy.

"Gillette gives a brief account of the apple curculio† (*Anthonomus quadrigibbus*) which has been seriously injurious in some parts of Iowa. Spraying, jarring and the destruction of fallen fruit are all recommended for this insect.

"A second edition of Miss Ormerod's valuable 'Manual of Injurious Insects and Methods of Prevention,' has been issued in England, during the year. It contains much of interest to horticulturists everywhere. Of present interest is the article on the 'wood leopard moth' (*Zeuzera æscali*). This pest has been quite recently imported into this country, and is now beginning to spread, radiating in every direction from the vicinity of Jersey City. In Europe it is destructive to pear; in this country it has, thus far, been found only on elm.‡

"Riley§ has treated the 6-spotted mite of the orange (*Tetranychus 6-maculatus*), and finds it easily controlled by the various soap and kerosene preparations, by sulphur and even clear water. Clean culture is also an effective method of preventing injury. He also calls attention|| to the fact that some of the scales infesting oranges in Florida have made their appearance in California, and repeats his suggestion that a quarantine be established in these states against infested plants

* New Zealand Farmer, Dec. 1889, cited in Insect Life ii. 290.

† Bull. 77. Iowa Agl. Exp. Sta.

‡ Ent. Amer. vi. 31. Garden and Forest. Jan. 1890, 30.

§ Rept. Sec'y. Agl. for 1889 (issued 1890)

|| Insect Life ii. 341.

received from the others. Coquillet has an excellent and interesting article* on the use of hydrocyanic acid gas for the destruction of the red scale in California. He finds this perfectly effective, and describes how, after the necessary apparatus has been obtained, the gas can be produced at a cost of about 26 cents per ordinary sized tree, quite a reduction from the older method which costs about 76 cents per tree.

"Valéry Mayet has issued a work on 'Les Insects de la Vigne' (Paris 1890, pp. 470, 5 plates, 4 colored, and 470 figures), which is the most complete and important ever issued on the subject, but calculated of course more particularly for the European grower.

"Newman† finds bagging grapes an effective protection against insect attack, but recommends it only for choice bunches.

"Riley has described the early stages of the rose-chafer‡ (*Macrodactylus subspinosus*), and gives a resume of the history of the species as an injurious insect. No additions to remedies against the mature insects are made, but it is suggested that if their breeding places could be found, kerosene applications might destroy the larvæ. J. B. Smith has given his experience§ with this insect in New Jersey, and finds that none of the recommended applications are of the least avail when the invasion is an extensive or serious one. It costs more to protect the vineyard than the resulting crop is worth, and he recommends bagging as the only practical remedy.

"On currants, Miss Ormerod|| describes an interesting attack by mites (*Phytoptus ribis*) for which no practical remedy has yet been found; and a white woolly scale (*Pulvinaria ribesiæ*) allied to our cottony maple scale, for which she recommends whitewashing the plants in the winter. Koebele reports¶ that in the Santa Cruz mountains, California, it is impossible to raise currants, owing to the attacks of one of the buprestid beetles (*Chrysobothris mali*), the larvæ of which bores into stems, branches and even roots. Collecting the beetles, burning infested stalks, and whitewashing as a protection, are suggested as possible remedies. Gillette also calls attention to a new currant borer** (*Hyperplatys aspersus*), a beetle, hereto-

* Insect Life ii. 202.

† Insect Life ii. 295.

‡ p. 13, report supra cit.

§ Bull. 11, Iowa Exp. Sta.

¶ Bull. 10, Ala. Exp. Sta.

|| Garden and Forest July 16, 1890.

** Bull. 22, Div. Ent. U. S. Dept. Agl.

fore found in cottonwood. The proposed remedies are the same as for the imported borer, cutting and burning infested stems. The currant has now a respectable list of insect pests!

"Webster gives some account of the strawberry crown-borer* (*Tyloclerema fragariae*) and describes the egg. A jumping beetle (*Haltica ignita*) has been found injurious near Columbus, Ind., and has been also complained of from Arizona and Florida. The beetle is widely distributed and is a close ally of the grape flea-beetle; it may therefore become one of the pests of the future. No suggestions as to remedies are made.

"J. B. Smith has treated monographically† the insects infesting the cranberry, giving the life-history of all the species and the means of destroying them. He strongly recommends laying out the bogs so that they can be flooded readily and the insects drowned out. He has during the past season put his own recommendations to practical use and the results, eminently satisfactory, will appear in the forthcoming annual report of the Station.

"Weed has continued his experiments with the striped cucumber beetle, and finds tobacco dust most successful, after mechanical covering of the plants.‡ Smith reports§ similar success with tobacco for this beetle, and gives also the results of a series of experiments on the squash borer, none of which were entirely satisfactory.

"Miss Murtfeldt reports|| a new rose slug (*Cladius isomeras*) as injurious in Missouri, and suggests hellebore as a remedy. J. G. Jack finds¶ that an European saw-fly (*Emphytus cinctus*, injured roses at the Arnold Arboretum. Riley and Howard have described** a new icerya (*I. rosæ*), injuring roses at Key West.

"Bailey has made a series of interesting experiments†† to ascertain the amount of injury to peach foliage by applications of Paris green and London purple. He concludes that London purple should not be used on peach; that Paris green at the rate of 1 lb. to 300 gal. of water, in a fine spray, did not injure foliage, and that 1 lb. to 350 gallons of water would probably be always safe. He found that nearly 40 per cent of London

* Bull. 33, Ind. Exp. Sta.

† Bull. 3, vol. ii. ser. 2, Ohio Exp. Sta.

‡ Bull. 22, Ent. Div. Dept. Agl.

** Insect Life iii. 93.

† Bull. K. N. J. Exp. Sta.

‡ Bull. 75, N. J. Exp. Sta.

¶ Garden and Forest, March 26, 1850.

†† Bull. xviii. Cornell Exp. Sta.

purple is quickly soluble in water, while Paris green contains no soluble arsenic. Analyses showed that arsenic from London purple entered into the texture of the leaf, while that from Paris green remains entirely upon the surface. Experiments upon plum showed that spraying with London purple so strong as 1 pound to 200 gallons produced no injury, and the statement is made that the supposed injury to plum foliage by the arsenites is really due to a fungus. He also found, as stated before by Cook, that old peach leaves are more susceptible to injury than young leaves. The immunity of the young growth is due to its waxy covering. Injury late in the season is more apparent than early in the season, because of the cessation of growth. A convenient device for producing a spray by compressing the end of rubber hose, is described and figured. Woodworth* has made some valuable tests upon the effects of arsenites upon plants. He confirms Bailey's statement that young leaves are less likely to be injured than old ones, and that 'fresh white arsenic produces less injury than any of the other arsenites,' but when the same material is not freshly mixed it is more injurious than the other arsenites. 'Paris green is uniformly less injurious than London purple.' He also finds that some varieties of the same species are more susceptible to injury than others, and he thinks that 'varieties could be produced by selection to which strong poisoning would do no injury.' As a rule, the lower surface of the leaf is more easily injured than the upper surface. Gillette has also made some most valuable experiments with the arsenites† with the view of discovering some method of lessening injury to the foliage. He finds that the addition of milk of lime to Paris green or London purple will almost entirely prevent such injury. As peach is admittedly the most susceptible, the results of this experiment with London purple are most interesting in comparison with Bailey's recommendation that it be not used on peach :

* Bull. 14, Ark. Exp. Sta.

† Bull. 10, Iowa Exp. Sta.

1 lb. purple to 25 gal. water.		1 lb. purple to 50 gal. water.		1 lb. purple to 100 gal. water.		1 lb. purple to 200 gal. water.	
No lime— <i>injury.</i>	Lime— <i>injury.</i>	No lime— <i>injury.</i>	Lime— <i>injury.</i>	No lime— <i>injury.</i>	Lime— <i>injury.</i>	No lime— <i>injury.</i>	Lime— <i>injury.</i>
.75	.55	.70	.02	.30	.04	.20	.01
.99	.60	.90	.02	.40	.05	.60	.00

“The London purple used in the Bordeaux mixture produced .02 injury at the rate of 1 lb. in 25 gallons of water, and none at all at a less strength. No chemical reasons for this difference in results are given. Analyses and experiments made at the New Jersey Station show that the addition of lime to London purple combines the soluble arsenic, forming with it an insoluble compound, and that only a mere fraction of 1 per cent will not so combine. This is really one of the most valuable results of the work of the year and will make London purple available at more effective strength than has been heretofore deemed prudent.

“This report would not be complete without a notice of letters patent No. 440,612, dated November 11, 1890. This was granted to Frank Jones, Morse, Kansas, on a wonderful ‘Process of Disinfecting for Destroying Insects on Trees and Plants.’ This consists in washing the body and limbs of the plant or tree, with a mixture or compound of the following ingredients in the specified proportion, to wit: soft water, five gallons; indigo, dissolved in the water, one ounce; asafœtida tincture, three ounces; soap, dissolved in the water, two one-pound bars, and at or about the same time drenching the roots of the tree with the following drench mixture applied in connection with sulphur, as hereinafter specified, to wit: Water five gallons; concentrated lye sixteen ounces; indigo one and one-half ounces; camphor tincture, four ounces, and sulphur, a sufficient quantity. In practice the sulphur is not mixed with the compound except in the act of applying, and the method of applying is as follows: In treating a tree six

inches in diameter, I first sprinkle about four ounces of sulphur upon the ground close around the foot of the tree. I then pour about six quarts of the drench mixture upon the sulphur around the root of the tree. The drench is absorbed by the roots of the tree, and being carried to the bark and leaves of the tree, combines with the wash above mentioned which has been applied to the trunk, and the result is effective in destroying all insect life upon the tree, while the leaves, bark and fruit remain uninjured.' Comment upon such a patented mixture is needless!"

Dr. Riley, Entomologist of the national Department of Agriculture, presented at the meeting of the Association of Economic Entomologists at Champaign, Illinois, in November, an extended report upon the "Outlook for Applied Entomology," from which I make copious extracts:

"The hydrocyanic acid gas treatment against scale-insects is becoming more and more common in California, and has, to a certain extent, superseded the use of washes, especially against the red scale (*Aspidiotus Aurantii*). This is largely due to the fact that recent experiments, carried on through Mr. Coquillett, have resulted in a great cheapening of the process. The expense has been reduced one-third, and the bulky machinery mentioned in my report for 1887 has been, for the most part, dispensed with. It has also been found that the use of the process at night is safer and more beneficial, in that it lessens the effect of the gas upon the foliage.

"The repeated importation of scale-insects from Florida into California has attracted much attention. The species concerned are principally the purple scale (*Mytilaspis citricola*), the long scale (*M. Gloverii*), and the chaff scale (*Parlatoria Pergandei*). The fact that these insects must have been repeatedly imported into the state in past years, without obtaining a foothold, has been used as an argument against a quarantine, and a great deal of discussion on the subject has been had in the California papers. From my own observations in the state I am convinced that where the proper conditions of shade and moisture obtain there is no reason why these scale insects should not get a foothold, but that they will probably die out in the hotter, drier, and less shaded localities. An agent who was sent to Pomona to investigate certain newly planted orange groves of Florida trees found

that while the trees were planted a year previously and had been dipped, according to custom there, in a caustic solution, every tree examined by him bore a few specimens of the purple scale. The excitement on this subject in California has been fostered by the claims of rival nurserymen engaged either in the importation of Florida stock or dealing in varieties grown at home, and from such contrary claims from persons prejudiced by their business interests it is difficult to extract the truth. A rigid quarantine, not absolutely prohibitive were wisest, for great injustice might be worked by absolutely prohibitive restrictions. Careful inspection and thorough treatment, if they could be guaranteed, would prove an effective safeguard, but it were unsafe to trust to them without a rigid quarantine.

"I have commenced a series of experiments upon the black scale (*Lecanium oleæ*), a species which, ordinarily occurring upon the olive, has long damaged citrus fruits in California. The horticulturist of the Wisconsin Station, E. S. Goff, has modified the Nixon pump by adding a tube so that kerosene may be drawn from one receptacle and a mixture of soap and water from another, thus forming a mechanical mixture in the act of spraying. This modification, at the request of Professor Henry, I have had tried in this series of experiments, and although it is too early to state the results, it may be said that so little time and labor are required in preparing a stable emulsion that this mechanical substitute will probably not come into general use. In this connection it may be observed that the formulæ recommended by some of our most voluminous writers are very misleading, and are calculated to produce only a mechanical mixture more or less unstable. The use of kerosene temporarily combined with water or soapsuds by mechanical means dates from many years back; it was a favorite remedy of my friend Thomas Meehan, who urged it in 1871 in the *Gardener's Monthly*; it was experimented with by others, and I used it successfully in 1872 against an undescribed lecanium on Austrian pine, as also against aphides on the place of Julius Pitman, of St. Louis, and in 1874 and 1875 against the congregated young of the Rocky Mountain locust. But the true and stable kerosene emulsion, which now forms one of the most satisfactory and widely used insecticides, and which requires two parts of

the oil to one of the emulsifying agent, violently churned until a stable, butter-like emulsion results, was the outgrowth of my efforts in the investigation of the cotton worm, the milk having been first suggested in 1878 by the late Dr. W. S. Barnard while working at Selma, Ala., and the most satisfactory formula in 1880, by H. G. Hubbard, from experiments which I had continued over two years, on orange trees.

"The grape phylloxera has continued to attract the attention not only of most European governments but also of those of Australia and New Zealand. It continues its spread in France, having at last invaded the more valuable champagne districts. The last report of the Superior Phylloxera Commission of that country shows that about 240,000 acres have undergone defensive measures, submersion being employed in 72,000, bisulphide of carbon in 145,000, and sulpho-carbonate of potassium in 23,000. The work is practically at an end in such departments as Hérault, Gard and Gironde, where the American resistant vines have most effectually been used; while the wine growers of Algeria, Spain, Italy, Portugal, Hungary, Austria and Switzerland are all battling against it, and are all more or less aided by their respective governments.

"The advent of the insect in New Zealand has been the cause of much writing and of much legislation there, and the government has been quite anxious to get the best and latest information on the subject. There is very little that is available in the way of published experience in this country, as my Missouri reports are now very difficult to obtain. I would repeat here in substance what I have recently written to F. D. Bell, agent-general at London for New Zealand, because the demand for the information is continuous, and our own people are, to a great extent, unfamiliar with the facts.

"During the more than twenty years' struggle in France against the species innumerable remedies have been proposed, most of which have proved to be absolutely valueless. A few measures have been devised, however, which, under proper conditions, give fairly satisfactory results. These consist in (1) methods which avoid the necessity of direct treatment, comprising the use of American stocks and planting in sandy soils; (2) the employment of insecticides (bisulphide of

carbon, sulpho-carbonate of potassium, and the kerosene emulsion); and (3) submersion.

"It was early found in the history of this phylloxera that most of the cultivated varieties of American grape-vines, as also the wild species, resisted, or were little subject to, the attacks of the root form (*radicicola*) of the phylloxera, although the leaf gall form (*gallicola*), which in point of fact does little if any permanent damage, occurs in greater numbers on many of our wild and cultivated sorts than on the European grape-vines, which are all derived from the single species, *Vitis vinifera*, and which are so exceedingly subject to the attacks of the root form. This fact was first noticed in France by M. Laliman, of Bordeaux, and later by Gaston Bazille, of Montpellier, and was independently proved on a more extended scale by my earlier investigations in the United States. The use of American stocks upon which to cultivate the susceptible European varieties has resulted in an enormous trade in certain American seeds and cuttings and now supersedes all other methods against the insect.

"It was my privilege and pleasure to spend a week in August, 1889, among the world-renowned Médoc and Sauterne vineyards of the Bordeaux district in France. Here, by virtue of the rich alluvial soil and the ease with which the chief vineyards can be submerged, the phylloxera has made slower headway, and the opposition to the use of American resistant stocks has been greatest. Yet they have finally vanquished prejudice and are, either from necessity or choice, rapidly coming into general use. When I say choice, I mean that even where the French vines yet do well and the phylloxera is kept in subjection by other means it is found that great vigor of growth and increase in healthfulness and yield of fruit result at once from the use of American stocks.

"Without going into a lengthy discussion of the subject of wild American species, those of practical importance to the grape-grower are the following: *Vitis æstivalis*, *V. riparia*, and *V. Labrusca*.

"The varieties derived from *V. æstivalis* are of value for their fruit as well as for their resistant qualities, and, being easily propagated from cuttings, they are very often used in France as stocks. The most important varieties are Jacquez, Herbemont, Black July, and Cunningham.

"The varieties of *Vitis riparia*, both wild and cultivated, are, on account of their special fitness, almost exclusively employed in France as resistant stocks, for which they easily take first rank. The varieties used are, first, the wild forms ; and, second, the cultivated varieties Solonis, Clinton, and Taylor. Of the cultivated varieties, the Clinton was one of the first vines tried for this purpose and has been extensively used with fair satisfaction. The Solonis now ranks above it, but is valueless for any other purpose on account of the acidity of its grapes. In California, the Lenoir, Herbemont and Elvira have been used, but late experience shows that the wild *riparia* is most satisfactory there, as it is in France.

"The different varieties of *Vitis Labrusca* are less resistant to the phylloxera than those above mentioned. Certain varieties have, however, been grown successfully in France, and of these the Concord has given much the best results ; but others, Isabella and Catawba, for example, succumb there to the root-louse, as indeed they do in many sections of this country.

"Of the many valuable hybrids obtained from the American species of vitis which are serviceable as stocks, the more important are the Elvira, Noah and Viala. The last named, perhaps of all the resistant varieties, gives the greatest percentage of successful grafts, and is admirably adapted for grafting on cuttings.

"Early in the study of the subject it was found that the nature of the soil has a very marked influence on the success of the different stocks. The subject has now been quite fully investigated in France, and the latest researches are formulated by the experimental school at Montpellier in the statement quoted below, which will be of interest as giving the various classes of soils, together with the American vines best adapted to each :

(1) New, deep, fertile soils : *Riparia* (tomentous and glabrous), *Jacquez*, *Solonis*, *Viala*, *Taylor* and *Cunningham*.

(2) Deep soils, somewhat strong, not wet : *Jacquez*, *Riparia*, *Solonis*, *Cunningham*, *Viala*, *Taylor*.

(3) Deep soils of medium consistency, new and not dry in summer : *Riparia*, *Jacquez*, *Solonis*, *Viala*, *Taylor*, *Black July*.

(4) Light pebbly soils, deep, well drained, and not too dry in summer : *Jacquez*, *Riparia* (wild), *Taylor*, *Rupestis*.

(5) Calcareous soils, with subsoil shallow or granitic : *Solonis*, *Rupestis*.

- (6) Argillaceous soils, white or gray : *Cunningham*.
 (7) Argillaceous soils, deep and very wet : *V. cinerea*.
 (8) Deep, sandy, fertile soils : *Riparia* (wild), *Solonis*, *Jasquez*, *Cynthiana*, *Ham*, *Black July*, *Rupestris*.
 (9) Light pebbly soils, dry and barren : *Rupestris*, *York*, *Madaira*, *Riparia* (wild).
 (10) Deep soils, with a tufa base and salt lands : *Solonis*.
 (11) Soils formed of debris of tufa, but sufficiently deep : *Taylor*.
 (12) Ferruginous soils, containing red pebbles of silica, deep and somewhat strong, well drained, but fresh in summer. All the varieties indicated, and in addition : *Herbemont*, *Clinton*, *Cynthiana*, *Marion*, *Concord*, *Herman*.

"The accompanying table from the last report of the Superior Phylloxera Commission indicates, better than words can tell, the steady growth in the use of American vines :

YEARS.	American vines covered	
1881	22,000 acres.	17 departments.
1882	42,700 "	22 "
1883	70,000 "	28 "
1884	131,909 "	34 "
1885	188,200 "	34 "
1886	276,900 "	37 "
1887	413,700 "	38 "
1888	536,900 "	43 "
1889	719,500 "	44 "

"On the subject of direct remedies, the value of the kerosene emulsion for this purpose has not been properly realized in France, because of the relatively high price of petroleum in her grape-growing departments. A series of experiments which I made in 1883 showed conclusively its great value for this purpose, as it not only destroys the insect in all stages, but also stimulates root growth.

"In this connection I have recently had a series of experiments made through Albert Koebele's agency, in the Sonoma Valley, California, to ascertain the effect upon the phylloxera of certain of the resin washes which proved so valuable when used against the fluted and other scale-insects. The results have been quite encouraging and the experiments have already shown that in the use of those washes we have a valuable addition to the underground remedies. Soaps were made by the use of bicarbonate of soda, sal soda, and caustic soda, each mixed with resin. In the earlier experiments the earth was removed about the base of the vine to a depth of 6 inches and for a diameter of 4 feet. Ten gallons

of the mixture were poured into each hole and found to penetrate from 12 to 16 inches or from 18 to 22 inches from the original surface of the ground. Most of the insects, as also the eggs, were destroyed to a depth of 16 inches. In the later experiments the holes were made only about 2 feet in diameter, and nearly, if not quite, the same results were obtained with half the amount, or 5 gallons of the mixture. The plan, which I had previously adopted for the application of insecticides to underground insects, of washing the mixture in with pure water was tried with good success. Soon after the first application 5 gallons of water were added, and 5 gallons more the following day. This would indicate that in the spring, when rains are frequent (occurring almost every day) in the Sonoma Valley, only a small amount of the mixture need be applied, and the rains will do the rest, as examination has shown that up to a certain point each application of water intensifies and extends the action of the original insecticide. The best soap was made with bicarbonate of soda, but the results of that made with caustic soda are so little inferior, while the price is so much less, that the caustic soda and resin soap mixture is the one which I would recommend. The formula which was found preferable is as follows:

Caustic soda (77 per cent.)	5 pounds
Resin	40 "
Water to make 50 gallons.	

"The soda should be dissolved, over a fire, in 4 gallons of water, then the resin should be added and dissolved. After this the required water can be added slowly, while boiling, to make the 50 gallons of the compound. To this, water may be added at the rate of 9 gallons for 1, making 500 gallons of the dilute compound, sufficient for one hundred large vines, at a cost of only 84 cents, or less than a cent a vine.

"Considering the effective way in which the ravaged vineyards of France have been, and are being, redeemed by the use of resistant American stocks, and considering the efficacy of some of the direct remedies discovered, it is passing strange that no disposition has ever been made of the premium of 300,000 francs offered in the early history of the trouble by the French government. It cannot be awarded to any one person, but should be distributed among those

whose labors and discoveries resulted in the several feasible and satisfactory methods of coping with the insect.

“Introduction of parasites and predaceous species.—The success which has attended the introduction from Australia of *Vedalia cardinalis* has been phenomenal.* Indeed, few who have not kept in knowledge of the reports and the actual condition of things can appreciate the remarkable character of the results, not only because of the brief period required therefor, but because of the thoroughness of the work of the little ladybird and the moral and financial benefit to orange growers which have followed in its wake.

“The striking success of the experiment has served to fix attention, not only of entomologists, but of fruit growers and farmers, to this mode of dealing with injurious insects, and there is no question but that the cases in which the experiment may be more or less successfully repeated are numerous. Let us hope, therefore, that the moral effect will be as great as its practical effect in opening up means and ways in the future, as it should serve to remove the disposition to deride any expenditure having such results for its object. Many fears have been expressed lest after sweeping off the icerya the vedalia, being so far as we now know confined to that species for food, should perish and that the icerya, preserved in some restricted places undiscovered by its enemy, would again multiply and become destructive. I firmly believe what I wrote in my last annual report as United States Entomologist, viz:

“We may hardly hope, however, that the last chapter in the story is written. On the contrary, it is more than probable, and in fact we strongly anticipate that the icerya will partially recuperate; that the vedalia will, after its first victorious spread, gradually decrease for lack of food, and that the remnants of the fluted scale will in the interim multiply and spread again. This contest between the plant-feeder and its deadliest enemy will go on with alternate fluctuations in the supremacy of either, varying from year to year according to locality or conditions; but there is no reason to doubt that the vedalia will continue substantially victorious, and that the power for serious harm, such as the icerya has done in the past, has been forever destroyed. We have learned, also,

(*) See Annals Hort. 1889, 62.

that it will always be easy to secure new colonizations of the vedalia where such may prove necessary, or even new importations should these become desirable.'

"During the year I have endeavored to return the favors received from Australia and New Zealand by sending there some of the natural enemies of the codlin moth, and from last accounts, though jeopardized by the action of the custom house authorities, the experiment promised success so far as a species of raphidia from California is concerned. I have also endeavored to introduce some of the parasites which attack the hessian fly in Europe, and which do not yet occur in this country. These efforts have been made by correspondence, for you will be surprised to learn that the restrictive clause in the appropriations to the department of agriculture for entomological work, which limits traveling expenses to the United States, is still maintained in the face of the vedalia experience, where by the expenditure of \$1,500 many millions were saved. The maintenance of this restricting clause in the last appropriation bill, under these circumstances, is a travesty on legislative wisdom, and all the more remarkable because done by the Senate in opposition to the House and the recommendations of both the Secretary and Assistant Secretary of Agriculture.

"While there is much to be done in this direction in future, I can not let this occasion pass without giving a note of warning. Success will only come in any particular case when exact knowledge is first obtained and the most thorough scientific methods are then adopted; and we cannot too severely condemn everything that savors of buncombe and ignorance. During the year the press of the country has prominently heralded the fact that a gentleman from San Francisco, especially charged to study certain entomological matters in the east, found while in Washington the two-spotted ladybird (*Coccinella convergetata*) feeding on "the aphid" right under the windows of the Division of Entomology of the Department of Agriculture, the inference intended being that the entomologist and his assistants were ignorant of the circumstance. Indeed a writer in one of the California papers of recent date announced this discovery under the sensational heading "Another good bug—the woolly aphid has found its Sedan." How supremely ridiculous this sort of thing ap-

pears to the well-informed entomologist I need not tell you, but it may be well for the information of the public to say (as I have not alluded to the matter elsewhere) that a number of different species of ladybirds feed upon the woolly aphid and that it is a rule with the insects of this family not to be select as to the particular aphid they prey upon. *Hippodamia convergens* (the species referred to as the Sedan of the woolly aphid) feeds over nearly the whole extent of the United States upon this particular schizoneura, among others, and the fact that both the species referred to feed upon various aphides is well known. That one of the species is also common upon the Pacific coast and that its being carried there from the east is like "carrying coals to Newcastle" may not, however, be so generally known. All such efforts as this carried on by persons unfit, from want of any special knowledge, for the mission, must invariably do harm, not only because of the negative results which follow but because of the lack of confidence in such work which they will engender in the minds of our legislators.

"Insecticide machinery.—A profitable hour might be devoted to the subject of insecticide machinery, but I must content myself with a few words. At a trial of such machinery at the Mareil-Marly vineyards, during the late Paris Exposition, I had an excellent opportunity of witnessing the latest advances made in France in this direction, and it was extremely gratifying to note that, with whatever modification of the power employed (and many of the machines were very ingenious), all other forms of spraying tip had been abandoned for vineyard purposes in favor of modifications of the Riley or cyclone nozzle. The superiority for most practical purposes of the portable knapsack pumps of V. Vermorel, of Villefranche (Rhône), France, was sufficiently evident. M. Vermorel has identified himself with the regeneration and improvement of French grape culture in many directions, and is, withal, an enthusiastic student of insect life. I spent a very profitable day with him last year, both at the factory and at his home, where he has established a virtual experiment station in the midst of a fine vineyard on American roots, and with every facility for various fields of investigations, none of which are deemed more important than the work in

A. H.—8

entomology, for he fully realizes how much there is yet to learn of some of the commonest insects destructive to the vine, even in an old country like France. But in no direction has he accomplished as much good as in his work with insecticide and fungicide machinery. His sprayer with independent pump, his diaphragm pump—L'Eclair—and his reservoir, with suction and force pump, are all admirably adapted for the purpose they were invented for and may be obtained in France at a cost from \$5 to \$7, which is tripled before reaching this country, thanks to our present tariff system.

"The last number of the *Journal of Mycology*, the serial publication of the Division of Vegetable Pathology of the Department of Agriculture, gives full description, with figures, of a knapsack spraying apparatus, for which the special merit claimed is cheapness, and which is named the Galloway sprayer.

"The combination of a suction and a force pump with knapsack reservoir has been frequently made in France, as illustrated by the apparatus styled the 'Cyclone' of Vermorel; the Japy, Vigeroux, Nouges and Perrin sprayers, and the sprayer of the society L'Avenir Viticole. A number of pumps manufactured in this country of this style were mentioned or described in the Fourth Report of the U. S. Entomological Commission. These, in general, are much inferior to the French pumps named, which are, however, modeled after those earlier and cruder forms. There are a host of other French knapsack spraying machines which differ from those mentioned, by propelling the liquid by means either of air pumps, diaphragm pumps, or devices in which the pump is attached to the reservoir by means of a rubber hose.

"In 1888 Adam Weaber, of Vineland, N. J., brought out the Eureka sprayer, a very serviceable knapsack pump modeled after the French machines. The French sprayers will cost, including duty, shipping, etc., from \$18 to \$25; the Weaber sprayer is sold for \$21, which is but little more than the cost of manufacture. Professor Galloway's machine is sold for \$14, or from one-fourth to one-third less than the Weaber or the French sprayers.

"In the first announcement of this pump in No. 1, vol. 6, of the publication cited, and in the later full description, no statement is made of the indebtedness of the inventor to these older

machines, except in the case of the original description of the lance and nozzle (*op. cit.* vol. 5, No. ii), where credit is given. This naturally gives the impression that the apparatus is novel in many or all its features.

“When compared with the French machines the following facts become apparent:

“1. The reservoir is practically identical with that of the Vermorel, Japy, and other French machines; and the opening for introducing the liquid with strainer and lid presents no new features.

“2. The pump is an ordinary double cylinder (or hollow piston) force pump, the hollow piston furnishing an air chamber which causes the liquid to be forced out in a continuous stream.

“3. The lance and nozzle combination consists of the Riley nozzle fitted to a lance and provided with a degorging apparatus, which also acts as a stop cock model, exactly after Raveneau's apparatus, and is practically the same as the Japy degorger and stop cock, except that the action is reversed. In the latter (see *Insect Life*, vol. i. p. 265, fig. 61) the spring normally closes the discharge orifice, and in the former the orifice is normally open and is closed by the action of a lever in the spring. That this modification of the foreign knapsack sprayers will prove a serviceable one for vineyard work, and by reason of its cheapness and availability come into general use, I have little doubt.

“A new and distinct type of insecticide machine, * the invention of G. F. Strawson, Newbury, Berks, England, has attracted no little attention and has received numerous awards during the past two years at various agricultural shows in England, and has been very favorably noticed and recommended by competent judges.

“International interests.—With the constantly increasing facilities for intercommunication between different parts of the globe the results obtained and experiences had in one part are soon available for the rest of the world. Thus France has more than repaid the United States for the good—however vast and important—that has resulted to her by the use of American resistant stocks. Her experience with these American vines has reacted beneficially upon our own viticulture

* *Annals Hort.* 1889, 177, fig. 15.

in many directions, but particularly in the great advance which her sons have made in insecticides and fungicides and in convenient, portable insecticide and fungicide appliances. It has often been said of the French that they are not an originating people; however that may be, they are very quick at adopting and improving ideas and discoveries once brought to their notice, and no nation is more appreciative of the immense practical benefits to be received by the adoption of the most scientific methods. In fact no nation has given greater government incentive to the pursuit of science in its bearings upon the welfare of mankind, and we may study with profit what she has of late years done in our own line.

"I had a delightful visit last August from John West, who came to this country as a delegate from Victoria to ascertain all he could of our methods; also from W. Catton Gasby, of Adelaide, who came to this country in a similar capacity. Economic entomology in their part of the world is extremely interesting to us; for while the seasons are reversed as compared with ours many of the same injurious insects occur in both countries. Thus, I was glad to get perfect confirmation from Mr. West of the fact that the Northern Spy and the Winter Majetin are found to protect the apple, grafted upon them, from the woolly aphis. A great deal has been published of late years in the New Zealand and Australian papers on 'blight proof' apple stock, and they have had an important experience, the outcome of sore necessity, for *Schizoneura lanigera* has there been one of the most serious drawbacks to apple culture.

"There can be no question but that this experience will prove of value to our apple-growers wherever these varieties grow well and the woolly aphis abounds. The use, as stocks, of such varieties as enjoy immunity from the woolly aphis has occurred to our own people, but no such extended experience has been had in regard to any particular resistant varieties. Some of our injurious insects are often worse in Australia than they are with us, and we may expect to reap the benefit of the experience had there with regard to them. This will doubtless be true not only of the codlin moth but of their peach aphis, which, from all that I can learn, is substantially the same species as that which does so much damage in our lighter soils along the Atlantic coast, and which Dr. Erwin F.

Smith, of the Division of Mycology of the Department at Washington, has carefully studied lately and described in great detail as a new species under the name of *Aphis persicæ-niger*, but which I have reason to believe is the *Aphis prunicola* of Kaltenbach.

"The Italians have been making a very interesting fight against an insect which has threatened their very important and extensive silk industry by its attacks upon the mulberry tree. This insect was described by Targioni Tozzetti in 1885 as *Diaspis pentagona*. It occurs upon a number of different trees, among them the paper mulberry, the spindle tree, the peach, the cherry, laurel, and certain willows, as well as upon the cultivated white mulberry, and it would seem that its taste for the latter tree is one recently acquired, judging from the late date at which the habit has attracted attention. The energetic director of the entomological experiment station at Florence investigated the pest in 1886 and recommended the use of mechanical means at the time of hatching of the young, viz; the scrubbing of the trunks and large branches with stiff brushes and a subsequent application of a mixture of soap and water with 4 or 5 per cent. of kerosene.

"Professor Franceschini, the editor of the *Rivistade Bacchicoltura*, recommended the adoption of the Balbiani formula as used against phylloxera and consisting of crude tar oil, naphthalin, quick lime, and water; the naphthalin being dissolved in the tar oil, and the water and lime afterwards added together. The insect appeared first in several cantons of the province of Como and speedily spread to the adjoining localities. The matter was brought to the attention of the Ministry of Agriculture and a commission was appointed, consisting of Professor Targioni Tozzetti, Dr. Alpe, and Dr. Andres, who immediately familiarized themselves with the methods in use in this country and have made extensive experiments with our kerosene emulsion, with our fumigating processes, and with other new remedies. The subject has been taken in hand with great vigor, and the government has interested itself to the extent of appointing inspectors in the different communes in the infested territory and establishing regulations which oblige the immediate report of new localities and the adoption of measures of extinction, when ordered by inspectors. These regulations also provide that the inspectors must do the work at the ex-

pense of proprietors when the latter refuse to do so; they prohibit the exportation of leaves from infested localities to others, and provide for indemnity to owners for the destruction of trees when the degree of infection is such as not to threaten the ultimate life of the trees. Expenses for experiments of all kinds and for the watching and care exercised by agents are borne by the state, while the expense for the execution of certain of the regulations are borne one-third by the proprietor and two-thirds by the local society. A fine for disobedience of the regulations is also provided for. The laws, as published, are none too severe considering the urgency of the case, and it is refreshing to notice the energy with which the government has met the threatened danger, and at the same time gratifying to note the appreciation shown of our own means and methods.

“Use of contagious germs in the field.—Most of you are aware that I have not had the greatest faith in the availability of contagious disease germs as a means of battling with injurious insects in field, garden, orchard, or forest, as there are so many delicate questions involved and so many obstacles in the way of practically carrying out any plan, however plausible theoretically, or true in principle. Our ability to contaminate healthy by diseased specimens is but a short step and leaves many important questions, as of rapid dissemination, untouched. The theory is very tempting and has been particularly dwelt upon by some who were essentially closet-workers, having but faint realization of the practical necessities of the case. Theoretically, with those insect diseases of a cryptogamic nature, having a complex life-history and a resting spore, the difficulties are greater than with those of a bacterial origin, and it is to these last that we should look for important aid if it be available. Yet if the work of Messrs. Luggar and Snow should be fully substantiated, the best results have so far been obtained with the entomophthora of the chinch bug. No one will be more pleased to have his doubts dissipated by some tangible evidence of the practicability of this method than myself. Success, if possible, will come only by investigation upon thoroughly careful and scientific lines, such as those begun and still pursued by Professor Forbes. The ease with which he conveyed the silk worm pebrine to other larvæ; his conveying the cabbage worm micrococcus to other larvæ,

and his carrying this micrococcus in cultures over winter are promising facts, as is also Professor Osborn's contaminating cabbage worms in Iowa with specimens brought from Illinois. Congress, having at its last session appropriated \$2,500 for some further investigation of the boll worm, the possibilities in this direction for this particular insect have caused me to plan investigations having for their object thorough field experiment with some of these disease germs.

"*Heliothis armigera*, the boll worm, is one of those cosmopolitan insects which has become more injurious in the United States than in any other part of the world, by virtue of its partiality for green corn, green cotton bolls, and green tomatoes. The polyphagous and partially endophytous habit of the larva renders its destruction difficult, except during the earlier free-living stages by the fine spraying of the arsenites on the under surface of the leaves. The ideal treatment for the larger burrowing worms is some rapidly spreading disease germ, that would penetrate and destroy them in their hidden recesses. The insect was reported as extremely abundant in cotton bolls during the summer, especially in Texas; but by the time the appropriation became available its numbers had decreased, and it was too late in the season to do much more than prepare for next year. We may expect, as a result of special investigation, much additional fact and experience both as to habits, natural enemies and means of control; but it is my desire to make the trial of these disease germs the special feature of the investigation. Of those employed in the investigation, F. W. Mally was a former assistant to Professor Forbes and has some experience in the study and culture of disease germs; while Dr. A. R. Booth is something of an enthusiast on the subject and has already established the suceptibility, through contact, of the boll worm to the cabbage worm micrococcus (*M. pieridis*) of Burrill. We hope to carry the germs through the winter so as to continue the experiment as early as possible next year. I have in mind as probably the most promising germ, that which affects *Nepheleodes violans* in a similar epidemic way, but which, as Professor Forbes informs me, is a quite distinct micrococcus, and I shall be pleased to have any of you co-operate with me next year, by informing me of any disease of this character that may prevail in your several localities."

§ 4. NATIONAL AND EDUCATIONAL INTERESTS.

There was an unusual activity in the discussion of general questions relating to horticulture during 1890. Perhaps the most important discussion is that upon

Legal control of new varieties.—The question of affording some legal protection to originators or holders of new varieties, as inventors are protected, was brought prominently into notice early in the year by A. L. Bancroft of San Francisco, through the medium of the California State Horticultural and Floral Societies. As the question is not entirely new, it may be well to consider it from its beginning. The measures so far advanced to afford legal control of varieties fall more or less distinctly under three heads: the plant patent, plant registration or certification, and copyright or trade-mark. Definite propositions for the plant patent appear to have originated with Jacob Moore, of Attica, New York, who, so early as 1874, drew up a bill for the protection of "the plant author."* This bill was "designed to supply, in part, the deficiencies of a bill introduced in the legislature last winter for this purpose." From that time until this—and probably even before that time—measures to secure a plant patent have been discussed. Thomas Meehan, editor of the *Gardener's Monthly*, always opposed the proposition, however, for the very sufficient reason that it is impracticable and impossible. He has thrown his influence, however, into the copyright or trade-mark scheme. Five or six years ago, Jacob Moore again proposed the plant patent system in an independent circular, and as this circular does not appear to have been preserved in permanent form, it is here inserted as a contribution to the history of our subject:

"The plant patent. The originator of a valuable new fruit, vegetable, or ornamental plant should have the exclusive privilege of giving it a name, and the exclusive right to grow, disseminate and sell it. This means in reference to class 3, below specified, to disseminate and sell to be grown.

* Gard. Monthly, xvi. 361.

New varieties should be subjected to examination and trial by a competent committee, that protective letters might not be given for old sorts, worthless new ones, and those not distinct enough to be identified. It would be necessary to classify plants, in the statute protecting them, according to the purpose for which they are valued, and apply the protection accordingly ; thus :

“Class 1. Perennial plants valued for the seed or fruit.

“Class 2. Plants valued for ornament.

“Class 3. Vegetables, vegetable fruits, cereals and other annuals valued as edible and marketable products.

“The purchaser of the right to grow a variety for individual use would not possess the right to sell the means of propagation unless such means was the product for which the variety was valued. For instance, such purchase would not confer the right to disseminate plants or cuttings of varieties belonging to class 1, nor plants of perennial and seed of biennial and annual sorts included in class 2, although the flowers and foliage could be sold as the ornamental product. With vegetable fruits such purchase would not confer the right to disseminate and sell the seed apart from the product containing it ; nor would purchase of the marketable product when it was the means of reproduction, convey the right to grow the plant unless that right was conveyed in writing by the owner of the protective right. It must be borne in mind that growing the plant, that is, the act of setting in the ground, propagating and cultivating it, is synonymous with manufacture, and the facility with which an article may be manufactured does not invalidate in the least this exclusive right of the patentee. The party, therefore, to whom the lawful disseminator sold plants, cuttings, seeds, etc., of the variety—according to the manner of its propagation—would receive from the latter a conveyance of the right to grow the sort, and to sell the marketable product under the name. If any one procured the sort elsewhere, that person could not show such conveyance when called for, and would have to pay the penalty the law imposed. The right to propagate to obtain the marketable product would be included in the right to grow the plant in all cases, as propagation is the result of growth with a majority of plants, and is part of the use.

“Of course, growers of protected varieties could transfer

the right to grow them with the real estate on which they were situated. All advertisements and circulars of protected varieties should be required to contain the words 'Protected according to Act of Congress,' with date affixed to the name; and when the marketable product was the means of reproduction, the party exposing it for sale should be required to place a sign or label of the name and affix with such product, or attached thereto. All packages of the latter for sending to a distance would be required to have the same words written or printed thereon. This requirement could be enforced by a fine for its neglect. When the system was inaugurated, the name, with the word 'protected,' and date would be sufficient. The penalty for growing the plant without right should be a moderate price per acre occupied by it, the area of land so occupied to be estimated by the ordinary distance of setting plants of the same class. For instance, it might be fixed at \$5 for an acre and a less area, of anything in classes 1 and 2 and \$3 an acre for anything in class 3. This measure, besides operating as a royalty to introducers of new productions, would have a tendency to regulate the price of them. They would seek to profit rather by sale of the exclusive right than by selling a few plants or seeds at exorbitant rates as they now do. To enable them to do so, the productions would have to be decided acquisitions. Probably they would be extensively taken on trial, to be paid for if found worthy, and not otherwise. The introducer of a new sort of potato or cereal of great merit, could afford to sell farm rights at \$2 each, and yet secure ample compensation. An infringement of the right to disseminate a production of this kind would be claiming the right to sell it to be grown by any party not possessing such right. It would not be selling the article to any one, even though the buyer should tell the seller he intended to grow the plant.

"Under this system of protection, the introducers of new productions would have the exclusive right to appear in print as the disseminators, and, if meritorious, this advantage alone might enable them to obtain compensation. Whether a valuable production originates on an individual's land through his design or by accident, it is his sole property. He has as much right to the exclusive possession of that kind of property as any other. This right is guaranteed to him by the con-

stitution of the United States which says: 'No person shall be deprived of life, liberty or property without due process of law.' If the owner disseminates it, and thus confers a general benefit, it is no more than just he should have such exclusive rights in its dissemination as will enable him to make the benefit reciprocal.

"But when the fact is considered that new varieties are often disseminated without the consent of the producers, owing to the facility with which plants, cuttings or seeds of the same may be stolen from the field or garden, for which there is no legal redress; that such productions are generally the result of many years of costly experiment; that, even when not stolen, the first sales of the production do not afford the originator an opportunity to obtain compensation (he must rely on these) by reason of the cost of introduction; when it is considered further, that the protection proposed would confer inestimable benefits upon the entire nation by stimulating efforts to improve the products of the soil through the scientific process of cross-breeding or hybridization; that such measure would protect the public in the purchase of new sorts by preventing unscrupulous nurserymen and dealers from furnishing old sorts under the names of the new, which has been so extensively practiced throughout the United States, then the unwisdom and foul injustice of the present lack of legal protection for the laborers in the highest department of horticulture begin to be realized. There is reason to believe that an enactment protecting them would form an era in history, and constitute one of the greatest legislative acts for the benefit of mankind of the nineteenth century."

The registration idea appeared in three forms last year, in Mr. Bancroft's and The Rural Publishing Company's propositions, where it was fully and carefully elucidated, and in a modified form in *Annals of Horticulture* for 1889. The history of Mr. Bancroft's effort is told as follows by a publication of the California committee on registration, which the extract also describes:

"As the present movement to establish a national plant register seems to be an assured success, it is nothing more than right that a correct history of the inception of the movement should be given. The idea originated with A. L. Bancroft of San Francisco, about two years ago. The first publi-

cation regarding the matter was a communication by him of crude ideas, which were published in *Garden and Forest*, issue of January 23, 1889. A paper was then prepared and read before the California State Floral Society, March 8, 1889. This was published in the *California Florist and Gardener*, in an issue of the succeeding month.* All of this time the ideas were being turned over, improved and commented upon. In January, 1890, the California State Horticultural Society and the California State Floral Society each elected a committee of three, the two committees to form a joint committee to formulate practical plans for the establishing of a national plant register. The committee was given full power to act and add to its numbers. A preliminary meeting was held February 17th, but the first regular meeting for organization was held April 17th, 1890. The attendance at this meeting was large and enthusiastic, and the following officers were elected: President, A. T. Perkins; Vice-President, Charles H. Shinn; Secretary, Emory E. Smith; Treasurer, Leonard Coates. Executive Committee—A. L. Bancroft, Chairman; Emory E. Smith, Secretary; G. P. Rixford, Charles H. Shinn and Fred C. Miles. Since then several meetings have been held by the joint and executive committees. The joint committee now has about fifty members, including many of the leading men of California. The report of the special committee was issued in circular form, May 1st, and published in *California Fruit Grower*. The plans for working have been submitted to and commented upon by many of the best thinkers throughout the country, the result of whose labors will be found in the accompanying circular, which is preliminary to the completing of the bill for presentation to Congress."

The first full expression of Mr. Bancroft's plan was "read at the request of the California State Board of Horticulture before the California State Fruit Growers' Convention at Los Angeles, March 13, 1890." This paper was widely distributed by the joint committee on registration, † but the committee subsequently drew up a somewhat modified statement, which it distributed during the summer, and which is as follows: ‡

"The present situation.—At the present time great confu-

* *Cal. Florist and Gard.* March, 1889, 78.—An editorial comment upon Mr. Bancroft's plan was made in the preceding issue, page 36.—*L. H. B.*

† Published in full in *Cal. Frt. Gr.* vi. 180 (March 22)

‡ Also in *Cal. Frt. Gr.* July 26.

sion exists in the names of existing varieties of fruits, flowers and plants, and the means of identification are entirely inadequate. There are many duplicate and local names, but there is no source from which to establish official or authoritative names. Those dealing in, or having to do with plants, are caused great annoyance, trouble and expense on this account. Our country is great, and has a large and growing population, and as this becomes more dense, greater attention will be given to horticulture in all its branches and to the refining influence of flowers and plants for ornamentation.

"It is fully time that horticulture throughout the entire extent of our country should be put upon a more business-like and comprehensive basis. When this is done, the progressive horticulturist will be justified in giving more attention to the originating and developing of the edible, ornamental, and otherwise useful plants, and mankind will be greatly benefitted thereby.

"The one thing which will give the greatest impetus to horticultural advancement at this time is, in our opinion, the establishing of a national plant register, which will give the description, history, etc., of plants and varieties, which shall be official and authoritative. In addition to this, the securing to the originator such protection as will justify him in devoting his time, thought and money to this work, would induce many to devote their lives to the securing of better varieties than we now have.

"These desired improvements can only be secured by the enactment of the necessary laws by the national government, and the United States Department of Agriculture at Washington (assisted by the Experimental Stations, Agricultural Colleges, etc.), is the most natural and appropriate place for their execution.

"The proposed plan of registration.—The registration of plants should commence at the point where botany ceases and horticulture begins. Provision should be made for registering at once the varieties of all species of plants having a commercial value. If at a future time it is thought best to extend the register to such species as have but a scientific or botanical value, the same plan should be so arranged as to admit of its being extended to any point desired.

"Lists of species should be started under which to register

their varieties. No attempt should be made to classify the varieties, but they should be added to their respective lists, and these examined and passed upon and be numbered consecutively from the beginning. The ground to be covered by the register should include the useful plants and their varieties which are found naturally or otherwise in the United States.

"The register can contain, 1st, the number ; 2nd, the official name ; 3rd, the popular and local names, or synonyms ; 4th, description ; 5th, short history and a statement of the peculiarities and habits of the plant, and 6th, in many cases if not always, a photograph, drawing or series of photographs or drawings of the plant, fruit or flower. While the reproduction of these views might be too expensive for general circulation and distribution, complete copies of them should be found at least in all the state libraries of the country and in many of the other larger libraries and educational institutions, while a printed copy of the register without photographs could be within the reach of every one, as one of the objects of this register is to provide a way for the identification of varieties of plants and to settle all questions and disputes.

"A great national botanical and horticultural garden would in time, be a natural outgrowth of a national plant register such as is suggested.

"The originators of new varieties of plants, who do not wish to secure exclusive sale-rights, should have the right to offer them for registration with a proposed name, and if after investigation they are accepted, the originator should be entitled to a certificate, without, or for a nominal charge, setting forth the facts of the case, which would secure to him the honor and prestige to which he is entitled.

"Previous to registration, lists of new plants with proposed names, descriptions, etc., should be published for examination, criticism and suggestion, and the plants should be kept in the list of proposed names until all questions are satisfactorily settled, when they may be numbered and entered in the register. After once being entered they should not be revised unless for very serious reasons.

"The plan is to employ the foregoing in a bill to be introduced into Congress ; what follows to be embodied in a second bill to be based upon the first, and to be introduced into Congress shortly after the first.

"The exclusive propagation and sale-rights for a limited time to originators.—Originators should have the right to offer new varieties for registration with a proposed name, upon the payment of a fee of—, for which he shall be granted an application certificate, at any time after the variety has been tested, so as to be satisfied of its valuable qualities, provided the plant has not been disseminated. The originator should give a history of the plant and state the points of excellence upon which he bases the application for exclusive sale-rights. If, after due investigation the plant is accepted, the originator after paying an additional sum of—, should be granted a certificate which would secure to him the exclusive right to propagate and sell the same for a term of—years, without a right to renewal. This would give him sufficient time to prepare stock for market, and an abundance of time in which to enjoy the exclusive privileges to sell.

"The author is protected by the copyright laws, the inventor by the patent laws, and they certainly deserve no greater recognition than the originator of new and valuable varieties of plants.

"The purchaser of a plant entered under this act should have the right to propagate it for his own use, but not to sell nor disseminate it except by special arrangement with the originator. At the time of purchase he should be furnished with a certificate of purchase by the vendor, who should keep an accurate record of the same as a means of protection to himself and to the purchaser. At any and all times before the expiration of the propagation right the possessor of a plant may be required to show how he came into possession, or hold himself responsible for violation of the law.

"Protection of this kind would be an incentive to extensive and systematic experimenting, which would, without doubt, result in producing new and valuable varieties.

"NOTE.—Even if there was dishonesty and fraud it could not injure the originator to any great extent without risk of detection and punishment, so long as he could not use the official name and number and description under which to advertise the varieties.

"When a new plant was offered for registration, if the claims of exclusive rights were not good, the plant should be rejected; thus fraud would be shut off at that point. All good plants being registered and numbered, very few plants could be sold which did not have the official name, number and description found upon the national register.

"Plan of work for establishing the register.—In order to accomplish the desired object in a reasonable length of time it will be necessary to have active, energetic and prompt co-operation from all parts of the country. Societies and organizations of horticulturists, fruit-growers, viticulturists, farmers, florists, nurserymen, gardeners, and all others interested, should take up the question in their meetings, and pass resolutions approving the general plan, and have them published in the local papers in order to familiarize the people with the movement. Copies of everything published upon the subject should be sent to the members of Congress and United States Senators from each state, and to the Joint Executive Committee in San Francisco. In every case Congress should be memorialized and petitioned to enact laws establishing the National Plant Register. Newspapers and periodicals should everywhere be interviewed by the committees and urged to advocate the movement. Duplicates of all memorials to Congress should also be sent to the Joint Committee in San Francisco.

"Two bills are being considered by the Joint Committee and will soon be submitted to the public for consideration and for suggestions. We would be glad to receive as many suggestions as possible before the drafts of the bills are completed.

Respectfully,

OFFICERS OF JOINT COMMITTEE :

A. T. PERKINS, Pres.

CHAS. H. SHINN, Vice-Pres.

EMORY E. SMITH, Sec.

LEONARD COATES, Treas.

A. L. BANCROFT,

EMORY E. SMITH,

CHAS. H. SHINN,

G. P. RIXFORD,

FRED. C. MILES."

In June and July The Rural Publishing Company, through *The Rural New-Yorker* and *The American Garden*, presented the following draft of a bill "to protect plantsmen":

"An act to secure to the originators and introducers of new and valuable varieties of plants a proper share of the benefits resulting from their labors and expenses in connection with such new varieties, and to protect the public from fraud in the purchase and sale of plants.

"SEC. 1.—Necessity for the law.—*Whereas*, one of the first objects of the government of the United States is to protect its citizens in the enjoyment of the rights of labor; and

"*Whereas*, the originators and introducers of mechanical ap-

pliances, and the originators and introducers of books and periodicals, etc., are already so protected by the copyright and patent laws; and

“*Whereas*, the origination and introduction of new varieties of plants are of great value to the nation and are the direct results of study, research, labor and expense; and

“*Whereas*, there is no natural protection for such labor and expense, and on the contrary the very nature of plants renders them capable of being cheaply and easily propagated, often to the express injury of the originator and introducer under the present lack of protection; and

“*Whereas*, unprincipled men do constantly obtain early specimens, or duplicate plants and seeds, etc., of such new varieties, and rapidly propagate them solely for the purposes of gain to themselves, and by such rapid propagation often to the injury of the vitality of the plants so propagated, and consequently to the injury of the reputation of the variety and the reputation of its originator, and injury to the persons buying such plants; and

“*Whereas*, unscrupulous persons, for the purpose of dishonest gain, do frequently introduce and sell old and sometimes worthless varieties of plants under new or false names and descriptions, thereby deceiving the public into the purchase of the seeds and plants of such varieties at increased and fictitious prices, and bringing legitimate trade into disrepute, and injuring honest growers and merchants:

“SEC. 2.—Testing stations.—*Therefore be it enacted as follows:* The Secretary of Agriculture is hereby instructed to invite the several state experiment stations which are in receipt of appropriations from the general government to co-operate in the work outlined herewith, and in the event of their refusal, tacit or direct, the Secretary is hereby authorized to organize, locate, or designate other testing stations, at public institutions or on private farms whose proprietors will thus co-operate with the government for the purposes of this act.

“SEC. 3.—Sending to stations under secretary's label: Preliminary certificate for protection.—Originators or discoverers of new varieties of useful or ornamental plants not previously offered for public sale shall have the privilege of

sending samples or specimens of seeds, cuttings, bulbs, roots and plants originated or discovered and propagated by them, under the label of the Secretary, to each of said testing stations, which by agreement with the Secretary of Agriculture shall have engaged to make careful trials of the same as hereinafter specified. A written application to the Secretary of Agriculture from the originator or discoverer, giving a sworn description of a new variety and its origin, and accompanied by a fee of \$1 shall entitle him to a preliminary certificate which shall set forth his claims to proprietary right in the said variety, and protect him in such right until such time as a full certificate of registry may be issued for the same by the Secretary of Agriculture, *Provided* that the said originator or discoverer shall send the specimen seeds, bulbs, roots or cuttings to the testing stations under the label furnished by the Secretary of Agriculture within a period of six months following the date of said preliminary certificate. The originator or discoverer shall also furnish to the board of experts, on the request of the Secretary, a specimen plant, seeds, fruits, bulbs or other product of his variety, for the purposes of identification and registry.

"Sec. 4.—Conditions of trial.—The Secretary of Agriculture shall make arrangements with the testing stations to receive seeds, plants, cuttings, bulbs or roots of new varieties and to make careful trial of the same, by cultivation and comparison with standard varieties, under proper physical conditions for the various sections and localities, and to make periodical itemized reports of such trials to the secretary.

"Sec. 5.—Board of examiners.—The Secretary of Agriculture shall cause the reports of trials of varieties of plants received from testing stations to be received by a board of experts skilled in the scientific and practical characteristics of cultivated plants, which board or bureau he is hereby authorized to organize from among the specialists in the employ of the department of agriculture, including private citizens, also specialists who shall be invited with full power to act with the board, which shall hold periodical sessions at such times and of such duration as the secretary shall determine.

"Sec. 6.—Register of cultivated plants: Certification of varieties: Certificate of introduction.—This board of experts shall carefully examine and compare the reports of trials

of varieties received from the testing station, shall give a simple and characteristic name to each variety (preference being given to the name desired by the owner), which official name shall be entered in a register of cultivated plants along with a brief account of its origin, the name of its originator or discoverer, its botanical name, its local or synonymical names and its economic characteristics as shown by the station trials. The Secretary of Agriculture shall, upon the recommendation of the board of experts, issue a certificate to the originator or discoverer of any useful variety of plants when in their judgment the same is merited, and after payment of a fee of \$25 to the department, which certificate shall be duly numbered and registered in the archives of the department and shall secure to the originator or discoverer, or his assignees, the sole right of propagation and sale of such certified variety for a period of 10 years following its date. The Secretary of Agriculture shall also issue a certificate of introduction to any citizen of this country who shall introduce a valuable new variety of plant from a foreign country, which shall be tested or reported by the testing stations and approved and registered by the board of experts in the same manner as above provided for varieties originated or discovered in the United States of America, after payment of a fee of \$25 to the department, and when he shall have proved that he has parted with a valuable consideration for such variety to the originator or discoverer in said foreign country, and shall have proved that the said variety has not been in general cultivation or offered for general public sale in any foreign country. Said certificate of introduction shall protect the introducer or his assignees for a period of five years in the propagation of the variety in this country.

“Sec. 7.—Register to include all cultivated plants. The Secretary of Agriculture is hereby directed to make the register of cultivated plants complete by the entry of all varieties of plants under cultivation, their classification and description under their best known and authoritative names; also to collect prepared specimens, photographs or sketches of the varieties for purposes of identification not above provided for. Copies of the register of cultivated plants and its yearly appendixes shall be prepared and furnished gratis to the libraries of testing stations, the state agricultural colleges, the

government departments and to such other institutions, societies and agencies as the Secretary of Agriculture may elect, on account of services rendered in the furnishing of information found valuable in its preparation. To all other people copies of the register shall be sold at a price to be fixed by the Secretary of Agriculture, provided that the said price be enough to cover, at least, the extra cost of printing and furnishing these copies additional to those above specified.

"Sec. 8.—Penalties for infringement.—Any person found guilty of unlawfully propagating or offering for sale any seeds, bulbs, roots, plants or cuttings of any variety of plant protected by the certificate of the Secretary of Agriculture, either under its proper, or a fictitious name, shall be deemed guilty of a misdemeanor and punishable in the same penalties as pertain in cases of infringement of the laws of the United States governing patent rights. It is provided, however, that lawful purchase shall entitle the holder to propagate such plants for his own use and the sale of the products thereof, excepting such as may be used as a means of propagation.

"Sec. 9.—The sum of \$50,000 is hereby appropriated for the purposes of this act.

"Sec. 10.—This act shall take effect and be in force immediately upon its passage and approval by the President."

The copyright or trade-mark system was clearly and forcibly outlined by Eugene Glen, of Rochester, N. Y., in January, 1878,* and so early as 1879 D. B. Wier, of Illinois, had copyrighted varieties of cherries.† Since then the trade-mark has been used with good results. One of the most prominent instances of its use is that by the Niagara grape company. The copyright discussion has been lately revived. Definite outline of it was made in an editorial in *Garden and Forest* in August, 1888,‡ in the course of remarks upon nomenclature as considered by the Society of American Florists: "The question of obtaining from Congress the enactment of a law permitting trade-marks or copyrights to be taken out for the protection of the rights of raisers of new flowers was not brought before the convention. The question of copyrighting new flowers is not altogether a new one, and has been discussed in different European countries at various times, as well as in the United States. The right of a man to enjoy the results of

* Gard. Monthly, xx. 25. † Ibid, xxi. 284, 314, 364. ‡ Gard. and For. i. 313.

his labors is as true when the product is a new flower as when it is a new book or work of art. The intelligence, thought and study expended in growing a new race of garden plants or new varieties of such a race are as great as is required to produce a book; but as long as the raiser of new plants must lose all benefits of these creations of his brain as soon as he sells the first individual, and so puts it in the power of his competitors to reap the benefits which should belong to him, the principal incentive to the production of new plants does not exist. This is a subject of such vital importance to the future of horticulture, here and everywhere, that we venture to suggest to the executive committee of the association that it deserves careful consideration at their hands."

Several societies have taken up the question, and the American Association of Nurserymen appointed a committee to take the whole subject into consideration and to report in 1891. The last public discussion of the subject in 1890, appears to have been the following review which I contributed to *The American Garden* for August:

"Control of new varieties by the originator has been a prolific source of discussion for a few years. Inventors are protected by patents, and authors by copyrights; should not originators of varieties of plants be similarly protected? The question seems, at first to admit of only an affirmative answer. But there are differences between plants and books or tools.

"The earlier movement designed to protect the originator was in the direction of a patent for new varieties. This movement looked upon varieties as inventions, and for this reason possesses elements of fatal weakness. It is a fact that nearly all new varieties are mere accidents to the 'originator,' who either picks them up in a chance fence-row, or finds them among a miscellaneous batch of seedlings. The 'originator,' is usually a mere 'finder,' and he may as well claim a patent for the invention of a white raspberry or double hepatica which he may find in the woods, as upon a new peach found in his hedge-row. When the time comes that men breed plants upon definite laws, and produce new and valuable kinds with the certainty and forethought with which the inventor constructs a new machine, or an author writes a book, plant patents may possibly become practicable.

"It is true, however, that the original proprietor of a new variety should be in some manner protected. One of the most important steps yet taken in this direction is the proposition to devise a national register of plants. This scheme originated with A. L. Bancroft, of San Francisco, and it has been adopted and advertised, together with a plan of propagation rights, by a joint committee of the California Horticultural and Floral societies. Essentially the same idea has been put into form by the present writer, and lists have been published which may 'serve the purpose of the certificates issued for new varieties by the Royal Horticultural Society in England, and by similar organizations in other countries.'* Mr. Bancroft's plan of registration appears to be too heavy and cumbersome; and the same may be said of the proposed federal law to secure a propagation right to the originator or introducer.

"The proposed legislation to protect plantmen and growers possesses the fault of all attempts yet made to secure protection for the originator—the absolute impossibility of determining what a variety is, and if it is entitled to be styled a novelty. There are hundreds of varieties now upon the market upon which no body of judges, even if expert horticulturists, could agree as to their distinctness from older sorts. A character which is regarded as worthy varietal recognition by one man is disregarded by another. In one soil, or under one treatment, a plant may be very different from one of the same stock grown under other conditions. Some contend that, among fruits, a seedling is always a distinct variety, no matter if its characters are identical with those of an older sort. This opinion is vehemently maintained by one of the earlier agitators for plant patents. But even if this position is correct, there are hundreds of instances in which the origin is wholly unknown, and which cannot, therefore, be brought as testimony. In fact, there are scarcely any two horticulturists who hold the same views regarding the limitations of varieties; and it is a fact that the limits constantly become more obscure the longer one studies varieties, a fact which the horticulturists of the experiment stations are rapidly learning. If this is true of men in the business, what can we expect of others who might be called to judge if

*Annals Hort. 1889, I, 96.

varieties are infringements? It is extremely doubtful if Congress could ever be persuaded to pass such a law. To this objection some have replied that there is also great difficulty in determining merits of new machines, but the patent law is not invalidated for that fact. But this statement does not satisfy the question. A machine is the same in Maine and California, while a variety may be different on adjacent farms.

"It is possible, it seems to me, to secure protection under existing laws if the registration of varieties is once secured. Trade-marks, trade-names, and brands are now protected. The name of a variety, once used in trade or admitted in a national register, becomes a trade-mark, with inviolable rights. This name could not be used to designate other varieties, and so long as the variety could not be admitted to the register under any other name, the originator would be tolerably secure.

"This might not prevent the re-naming of the variety by obscure persons, in defiance of the national register, but those who steal varieties need also to steal the best known name as an advertisement. If this scheme would not entirely overcome risks, it would at least reduce them to a minimum and would result in as thorough protection as could possibly be secured by any special law. An organized effort strong enough to effect a registration of plants would find little difficulty in discovering tricksters. The originator should secure a certificate of registration, and the public would very soon learn to buy only of those who hold one. Sale of the right to use the name or trade-mark should be recorded at the office of registration, so that all stock could be traced to its source. This is an imitation of the registration of domestic animals. There is no law to compel one to register an animal, but every breeder knows that it is only through registration that he can advertise, sell and protect blooded stock. And there is no intelligent purchaser who would think of negotiating for such stock without having obtained the testimony of the herd-book.

"To be sure, this plan would not remove the difficulties concerning the limitations of varieties, but it would place the definition of varieties upon the experts in charge of the national register, rather than carry it into court. In fact, it

would prevent all litigation, for all varieties admitted to the register would be legitimate, and for all others protection could not be expected.

"The solution of the whole matter is exceedingly simple. Let a register of cultivated plants be instituted at the Department of Agriculture. Then let the originator send to the department a specimen, description and, perhaps, picture of his novelty; if the variety appears to be a new one, a certificate of registration is issued for it. If the originator chooses to sell his stock to dealers, let the fact be recorded, and a record of transfer be issued to the purchaser. If the originator desires to control the propagation of the variety he can do so for any length of time by specifications in his contracts with dealers. It is evident that after a variety is put upon the retail trade, it becomes public property, and no statute can further protect it. When a man buys for the purpose of planting, he buys also the privilege of selling the fruit or other commercial portion, and this portion is often the very one used for propagation of the particular variety. No law could prevent the propagation of melons and most other vegetables, when the varieties are put upon the market, even were there no common rights at issue.

"An eastern nurseryman has already secured a copyright upon the name of a new grape. With the aid of a register to record his variety and others, he would be practically secure. In fact, he finds himself secure even now. The register, as I have suggested it, is not a burdensome affair, although objection has been raised to registration for the very reason that it would entail so much expense. A list of American kitchen-garden vegetables, comprising 2,696 entries, is made by a private individual in the '*Annals of Horticulture*,' and the greater part of the work lay in revising the names. And the same volume makes a catalogue of the introductions of 1889, which is certainly very nearly complete, comprising 444 entries. These lists are the first attempts yet made in this country toward a registration of plants. If the fuller register is ever made by the Department of Agriculture, descriptions will have to be added, but one clerk could perform all the labor required to do this, after existing varieties were entered.

"All this needs no memorial to Congress, no great ma-

chinery, no new law. It is in every way feasible and practicable, and no doubt a mere petition to the Secretary of Agriculture by the leading horticultural organizations would effect its execution. On the other hand, it is probable that Congress would never pass the laws proposed. If they should exist, they could never be enforced, and they would be so cumbersome, circuitous and tedious as to fall of their own weight; and it should be borne in mind that all special protection is likely to increase prices of the protected article to such an extent as to greatly lessen its sale or to impose unnecessary burdens upon the planter."

Nomenclature. Discussions of nomenclature of varieties received considerable attention during the year. The proper naming of varieties must precede any attempt to secure legal protection for the varieties, and the subject therefore has a great importance beyond the more immediate one of avoiding confusion and educating the popular taste. Two distinct endeavors are commonly confounded under the discussions of nomenclature. Nomenclature proper has to do with the form and character of the name, and does not consider the plant to which the name is applied. The labors of the American Pomological Society, which are now well known, and those of the committee on nomenclature of the horticulturists of the experiment stations* are good examples in point. The other movement is one to determine synonymy, or the different names under which a variety or species passes. It considers the plant rather than the name. Concerted effort in determining the synonymy of plants has been reached at last by the Society of American Florists, and its last report† contains a good list of synonyms. The experiment stations early began working in the same line with vegetables.

There is a perceptible gain apparent throughout the country in the furtherance of a revised and modest nomenclature for all varieties. The movement is necessarily one of slow growth and its promoters must not expect too early results. The movement is also spreading somewhat in Europe, although more slowly than in this country, and it is only in certain classes of ornamental plants that definite reform has been attempted. The following rules for the naming of orchids, adopted recently

* *Annals Hort.* 1889, 78.

† *Rep.* 1890, *Append.* v.

by the Council of the Royal Horticultural Society of England, deserve a wide publicity both for their immediate value in simplifying orchid nomenclature, and as a guide for the naming of other plants, to which they may be also applied :

"Section I. Genera, species, well-marked varieties and natural hybrids.

"1. The names of natural genera, species, and well-marked varieties, as well as of presumed wild hybrids, shall be written so as to accord with botanical language and ways, and to conform with the laws of botanical nomenclature (*Lois de la Nomenclature Botanique*) as adopted at the International Botanical Congress at Paris, in 1867.

"2. Exhibitors showing for the first time a plant under a Latin name, shall be required to furnish the name of the botanist who has described the plant.

"Section II. Artificial hybrids between genera.

"3. Every bigener shall receive a generic name in Latin, formed by combining the names of the parent genera, and a specific name also in Latin, the sign of hybridity (x) being always added.

"Section III. Artificial hybrids between species.

"4. Hybrids between species raised artificially shall be named in Latin, with the addition of the word hybrid, or of the sign of hybridity (x).

"Section IV. Artificial crosses between varieties.

"5. Crosses between varieties raised artificially should receive suitable vernacular names.

"Section V. General recommendations.

"6. The orchid committee shall decline to recognize any unauthorized name, or any name that is deemed unsuitable, or is not applied in conformity with the preceding rules.

"7. A name once authoritatively adopted shall not be altered, unless in case of material error.

"8. An award may be made to any plant that is considered by the committee worthy of such distinction, even though it be unnamed, or not named in accordance with the preceding regulations, *provided that*, within a reasonable time, to be determined by the committee, a proper name be given. Any award made under the circumstances shall be suspended until the plant has been properly named.

"9. The operation of these rules shall be prospective, not retrospective.

"10. The council wishes to impress upon orchid growers the desirability of obtaining drawings or photographs of all new and certified orchids, and of depositing such drawings in the library of the society, for reference.

"11. The council also desires to remind cultivators of the great importance of preserving specimens for future reference and comparison, and suggests that, wherever practicable, specimens should be sent for this purpose to the Director of the Royal Gardens, Kew."

Road agitation. For two or three years there has been great activity in the discussion of means for improving country highways. The necessity of improved methods of making and maintaining roads has been brought to the attention of several legislatures, and new laws have been enacted. The general agitation of the highway problem is a matter of contemporaneous history; it is only necessary here to call attention to a system of numbering country residences and naming the roads, which originated with A. L. Bancroft of San Francisco. The general plan of the movement may be learned from the following editorial comment in *The American Garden* for August:

"The latest proposition for the socialization of the country comes from California, and it is known as the 'ten-block system' of numbering land and houses. 'The system is to divide each mile along the roads into ten equal parts, or imaginary blocks, of 528 feet, 176 yards, or 8 chains each, and to assign to each block two numbers, one on each side of the road. Any or every house within a block is given the number of the block. The first one—and in nearly every case it will be the only one in the block—has simply the number; the second one has the number, followed by the letter A; the third by the letter B; the fourth by C, and so on—Nos. 196, 196A, 196B, 196C, etc. If there is no house in the block, the number is assigned to it just the same, and it remains in readiness should a house be built at a future time.'

"The further details of the system are few, but we cannot present them here. This is the first practicable attempt yet made, so far as we are aware, to know and record the inhabitants of the country. The movement is spreading in the Golden State, and it ought to spread in every township in

land. The advantages it presents are numerous and important. The traveler could instantly compute distances and acquire directions. The numbers on the gate-posts or over the doors would be mile-stones. Country directories could be published. Mileage of jurymen could be calculated. But above all, it would quicken communication and intercourse in the country. It would be a powerful civilizer.

"To make this feasible, a system of naming country roads must be inaugurated, and this, too, our California friends are perfecting. In Contra Costa county, lying against San Francisco, are such charming bits as the following: Contra Costa Highway, running through the county and striking the county seat; Rio Vista, Mountain Drive, Willow Pass Road, Golden Gate Way, Lime Ridge Crossing, Stanley Road, and the like. We know of nothing so good as this since the efforts of dear old Jacob Bigelow in naming the famous walks and drives of Mount Auburn.

"All this could add much charm to the country, for it would personify nature, commemorate events, and localize sentiments."

The extent to which this movement has been carried is told in a late issue of the *California Fruit Grower*:*

"Contra Costa county has in the last few months become famous throughout the United States, on account of its bold and original movement to name all the roads and number the residences in the county. So general has been the interest awakened in the scheme that several states and numerous counties are preparing plans and estimates for systematically introducing and adopting the same plans. Even foreign papers have commented favorably and have advised the local adoption of the Contra Costa scheme entire, or in more or less modified form. The good people of Contra Costa county certainly have every reason to feel proud of the enviable notoriety thus obtained. It has taken the people themselves quite a while to become thoroughly imbued with the necessary enthusiasm for the successful carrying out of this new and generally beneficial measure. The work is now, however, nearly completed.

"The roads are all located and names listed and such approximate estimates made as are necessary, and the whole is

*Vol. vii. 387 (Dec. 20, 1890).

ready for presentation to the board of supervisors. The residents of the county are almost unanimously in favor of the adoption of the proposed plans, and the county officials will, no doubt, accept them without hesitation. It is but seldom that men have the opportunity to make for themselves such an honorable place in the history of their county and of their country; for, undoubtedly, the adoption of the Contra Costa system of road-naming and house-numbering will in a short time become general throughout the United States and in European countries, and every one of the hundreds of thousands of sign-boards erected will stand a monument to the projectors and executors of the Contra Costa plan."

The Census. The eleventh census has undertaken the compilation of statistics of horticulture. This is the first attempt yet made by the government to measure the extent of our horticultural interests, and it comes as a response to repeated demands from the agricultural press. Several horticultural interests are to be made the subjects of special reports, as the nursery business, semi-tropical fruits, seed-farms, truck farms and the florists' business. These subjects have been placed in charge of J. H. Hale of South Glastonbury, Connecticut. As a preliminary labor, a directory is being made of all horticulturists in the United States who cultivate one-fourth acre or more.

The general census schedules contained the following questions concerning orchard and garden products: *Onions*: Field crop, number of acres, bushels produced and sold, and value. *Potatoes*: Sweet and Irish, bushels produced and sold. *Market garden and small fruits*: Number of acres in vegetables, blackberries, cranberries, raspberries, strawberries and other small fruits, and total value of products in 1889. *Vegetables and fruits for canning*: Number of acres and products, in bushels, of peas and beans, green corn, tomatoes, other vegetables and fruits. *Orchards*: Apples, apricots, cherries, peaches, pears, plums and prunes, and other orchard fruits; in each the number of acres, crop in 1889, number of bearing trees, number of young trees not bearing, and value of all orchard products sold. *Vineyards*: Number of acres in vines bearing, and in young vines not bearing; products of grapes and raisins, and value in 1889.

The new tariff. The Fifty-first Congress passed "An act

to reduce the revenue and equalize duties on imports, and for other purposes," the general provisions of which went into force October 6, 1890. Following are the schedules of duties upon horticultural products, with corresponding rates under the old law :

	<i>New Schedule.</i>	<i>Old Schedule.</i>
Beans, per bushel, 60 lbs.	40 cents.	10 per cent.
Peas, dried, per bushel.	20 "	30 "
Peas, green, in bulk, in barrels, sacks, etc, per bushel, 60 lbs.	40 "	10 "
Peas, split, per bushel, 60 lbs.	50 "	20 "
Peas in cartons, paper and other small packages, lb. 1 "	—	—
Beans, peas, and mushrooms, prepared or preserved in tins, jars, bottles or otherwise, ad valorem.	40 per cent.	30 "
Cabbages, each.	3 cents.	10 "
Onions, per bushel.	40 "	10 "
Potatoes, per bushel, 60 lbs.	25 "	15 cents.
Vegetables in natural state not specially provided for, ad valorem.	25 per cent.	10 per cent.
Vegetables of all kinds, prepared or preserved, including pickles and sauces of all kinds, not specially provided for, ad valorem.	45 "	30 " *
Garden and agricultural seeds not specially provided for.	—	—
.... (Agricultural seeds free, old schedule).	20 "	20 "
Plants, trees, shrubs, and vines of all kinds, commonly known as nursery stock, and not specially provided for, ad valorem.	20 "	Free.
Apples, green or ripe, per bushel.	25 cents.	"
Apples, dried, per lb.	2 "	"
Grapes, per bbl. of 3 cu. ft.	60 "	20 per cent.
Plums and prunes, per lb.	2 "	1 cent.
Figs, per lb.	2½ "	2 cents.
Oranges, lemons, limes, in packages of capacity of 1¼ cu. ft. or less, new schedule, 13 cts.; old schedule, 13 cts. per half-box of oranges, 16 cts. lemons.	—	—
In packages between 1¼ to 2½ cu. ft., new schedule, 25 cts.; old schedule, 25 cts. per box of oranges, 30 cts. lemons.	—	—
In packages between 2½ to 5 cu. ft., new schedule, 50 cts.	—	—
In packages exceeding 5 cu. ft. for every additional cu. foot.	10 cents.	—
In bulk, per M, new schedule, \$1.50; old schedule, \$1.60 oranges, \$2 lemons.	—	—

* Pickles and sauces, 35 per cent.

	<i>New Schedule.</i>	<i>Old Schedule.</i>
Also 30 per cent. ad valorem upon boxes or bbls. containing oranges, lemons or limes.		
Old schedules per 196 lb. flour bbl., 55 cts. for oranges; and oranges, lemons and limes in unenumerated packages, 20 per cent. ad valorem.		
Raisins, per lb.	2½ cents.	2 cents.
Comfits, sweetmeats and fruits, preserved in sugar, syrup or molasses or spirits, not specially provided for, and jellies and jams of all kinds, ad valorem.	35 per cent.	35 per cent.
Fruits preserved in their own juices, ad valorem. 30 "	20 "	20 "
Orange and lemon peel, preserved or candied, per lb.	2 cents.	35 "
Almonds, not shelled, per lb.	5 "	5 cents.
Clear almonds, shelled, per lb.	7½ "	7½ "
Filberts and walnuts of all kinds, not shelled, per lb.	3 "	3 "
Filberts, shelled, per lb.	6 "	3 "
Peanuts, not shelled, per lb.	1 "	1 "
Peanuts, shelled, per lb.	1½ "	1½ "
Nuts, shelled or not shelled, not specially pro- vided for, per lb.	1½ "	2 "
Champagne and all other sparkling wines, in bot- tles containing each not more than one quart and more than one pint, per dozen.	\$8 00	\$7 00
Containing not more than one pint each and more than one-half pint, per dozen.	4 00	3 50
Containing one-half pint each or less, per dozen. 2 00		1 75
In bottles or other vessels containing more than one quart each, in addition to \$8 per dozen bottles on the quantity in excess of one quart, at the rate of, per gallon.	2 50	2 25
Still wines, including ginger wine or ginger cordial and vermouth, in casks, per gallon.	50	50
In bottles or jugs, per case of one dozen bottles or jugs, containing each not more than one quart and more than one pint, or 24 bottles or jugs containing each not more than one pint, per case.	1 60	1 60
Cider, per gallon.	5 cents.	20 per cent.
<i>Free List :—</i>		
Currants, Zante or other.		1 cent per lb
Dates.		1 " "
Fruits, green or dried, not specially provided for.		
Tamarinds.		
Cocanuts, Brazil nuts, cream nuts, palm nuts, palm nut kernels.		
Olives, green or prepared.		
Orange and lemon peel not preserved or prepared.		

Free List, continued.

Orchids, lily of the valley, azaleas, palms and other plants used for forcing under glass, for cut-flowers or decorative purposes

Plants, trees, shrubs, roots, seeds, imported by the Department of Agriculture or U. S. Botanic Gardens.

Sauerkraut.

Seeds as follows, not specially provided for : anise, canary, caraway, cardamom, coriander, cotton, cummin, fennel, fenugreek, hemp, horehound, mustard, rape, St. John's bread or bene, sugar beet, mangel wurzel, sorghum or sugar cane, all flower and grass seeds. Also bulbs and roots, not edible.

Tapioca or cassava.

Tea and tea plants.

Yams.

Educational matters. The only important question of education brought before the horticultural societies of the year was that of a better education for florists, as outlined in the address of President J. M. Jordan before the Society of American Florists. The following editorial comment upon this address by *The American Garden** will sufficiently indicate its scope :

“The Society of American Florists has a high ideal set before it in the address of the retiring president. The society should be more than a trade organization. Its objects are ‘not only to instruct its members in their daily avocations, but to educate the masses in horticulture, by widening and deepening an interest in our profession, by increasing our membership, active and honorary, until we embrace all the leading men of the country who are interested in the various callings of horticulture ; all men engaged in scientific research tending to advance the profession ; the formation of kindred associations ; encouraging exhibitions of plants and flowers, by bringing into closer relations the retail dealer with the grower and wholesale dealer.’

“All this calls for general education and culture, and it demands a more wide-spread appreciation of ornamental gardening. We have not yet come to that stage in this country when gardening is in general appreciated as a work of art. Ornamental gardening is usually judged solely by its gross form and color. Gardeners must get out of old ruts. They must put spirit and expression into their work. But this, again, means that the gardener must be educated.

* xi. 617 (Oct. 1890.).

“President Jordan sees two general ways of elevating the garden and the gardener. Cities are growing, and the country is taking on a better life. Gardening is adapted to all conditions, ‘and it is committed to our hands to extend our parks and boulevards far into the country until city is linked to city, and the most rural districts will feel the vitalizing forces of plants and flowers.’ Those who are benefitted by institutions of learning ‘are very few compared with the great mass of people that frequent our parks and public grounds to take object-lessons, where young and old, rich and poor, learned and illiterate meet on one common level to drink in nature’s best gifts to man.’ Yet in the educational institutions a higher and more symmetrical culture can be attained. President Jordan again calls the attention of the society to the importance of some school or college training for the florist. ‘Science shows us how the things we have to deal with in our homeliest toil connect us (if we but understand the linking) to what is most elevating in man’s thoughts and hopes. It helps supply that food for the mind, without which we starve in drudgery, but by the strength of which we rise to a higher plane of life’

“The education problem has long been a vexed question among the florists, and there is yet no appearance of a solution of it. Members are divided by conflicting aims, and there has been no one with a practicable and clear-cut proposition who could lead the organization to any definite action. Many are making the vital mistake of supposing that the first requisite in a florists’ school is a corps of florists to direct it. The first requisite in any school is men who can teach. When it so happens that the teacher is also a successful grower, the highest ideal is attained. But the first requirement of any man who imparts instruction is ability to fire the enthusiasm of his students. So it often happens that the most successful teachers are distanced by their pupils. President Jordan thinks that wealthy men could be induced to endow florists’ schools, and no doubt they will do so as soon as they feel assured that a sufficient demand and interest exists. The bequest of the late Henry Shaw, of St. Louis, is an example worthy of emulation. But some of the land-grant colleges would no doubt take up this work actively if the florists should

once present a definite plan or request to them. Nothing can be accomplished without united and positive action, and the apparent lack of interest in the discussion which followed President Jordan's address to the society at Boston seems to indicate that the time is not yet ripe for florists' schools."

The most important educational movement of the year was the passage of an act by Congress to extend the facilities of colleges of agriculture and mechanic arts which are founded upon the land grant of 1862. This act was approved by the President August 30, 1890. It was introduced by Senator Morrill, of Vermont, to whom the nation also owes the land grant. The document is so important that I append it in full:

"An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts established under the provisions of an act of Congress approved July second, eighteen hundred and sixty-two.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be, and hereby is, annually appropriated, out of any money in the Treasury not otherwise appropriated, arising from the sales of public lands, to be paid as hereinafter provided to each State and Territory for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established, in accordance with an act of Congress approved July second, eighteen hundred and sixty-two, the sum of fifteen thousand dollars for the year ending June thirtieth, eighteen hundred and ninety, and an annual increase of the amount of such appropriation thereafter for ten years by an additional sum of one thousand dollars over the preceding year, and the annual amount to be paid thereafter to each State and Territory shall be twenty-five thousand dollars, to be applied only to instruction in agriculture, the mechanic arts, the English language and various branches of mathematical, physical, natural and economic science, with special reference to their applications in the industries of life, and to the facilities for such instruction: *Provided,* That no money shall be paid out under this act to any State or Territory for the support or maintenance of a college where a distinction of race or color is made in the admission of students, but the establishment and maintenance of such colleges

separately for white and colored students shall be held to be a compliance with the provisions of this act if the funds received in such State or Territory be equitably divided as hereinafter set forth: *Provided*, That in any State in which there has been one college established in pursuance of the act of July second, eighteen hundred and sixty-two, and also in which an educational institution of like character has been established, or may be hereafter established, and is now aided by such State from its own revenue, for the education of colored students in agriculture and the mechanic arts, however named or styled, or whether or not it has received money heretofore under the act to which this act is an amendment, the Legislature of such State may propose and report to the Secretary of the Interior a just and equitable division of the fund to be received under this act between one college for white students and one institution for colored students established as aforesaid, which shall be divided into two parts and paid accordingly, and thereupon such institution for colored students shall be entitled to the benefits of this act and subject to its provisions, as much as it would have been if it had been included under the act of eighteen hundred and sixty-two, and the fulfillment of the foregoing provisions shall be taken as a compliance with the provision in reference to separate colleges for white and colored students.

“SEC. 2. That the sums hereby appropriated to the States and Territories for the further endowment and support of colleges shall be annually paid on or before the thirty-first day of July of each year, by the Secretary of the Treasury, upon the warrant of the Secretary of the Interior, out of the Treasury of the United States, to the State or Territorial treasurer, or to such officer as shall be designated by the laws of such State or Territory to receive the same, who shall, upon the order of the trustees of the college, or the institution for colored students, immediately pay over said sums to the treasurers of the respective colleges or other institutions entitled to receive the same, and such treasurers shall be required to report to the Secretary of Agriculture and to the Secretary of the Interior, on or before the first day of September of each year, a detailed statement of the amount so received and of its disbursement. The grants of moneys authorized by this act are made subject to the legislative assent of the several States

and Territories to the purpose of said grants: *Provided*, That payments of such instalments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof, duly certified to the Secretary of the Treasury.

"SEC. 3. That if any portion of the moneys received by the designated officer of the State or Territory for the further and more complete endowment, support, and maintenance of colleges, or of institutions for colored students, as provided in this act, shall, by any action or contingency, be diminished or lost, or be misapplied, it shall be replaced by the State or Territory to which it belongs, and until so replaced no subsequent appropriation shall be apportioned or paid to such State or Territory; and no portion of said moneys shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation, or repair of any building or buildings. An annual report by the president of each of said colleges shall be made to the Secretary of Agriculture, as well as to the Secretary of the Interior, regarding the condition and progress of each college, including statistical information in relation to its receipts and expenditures, its library, the number of its students and professors, and also as to any improvements and experiments made under the direction of any experiment stations attached to said colleges, with their costs and results, and such other industrial and economical statistics as may be regarded as useful, one copy of which shall be transmitted by mail free to all other colleges further endowed under this act.

"SEC. 4. That on or before the first day of July in each year, after the passage of this act, the Secretary of the Interior shall ascertain and certify to the Secretary of the Treasury as to each State and Territory whether it is entitled to receive its share of the annual appropriation for colleges, or of institutions for colored students, under this act, and the amount which thereupon each is entitled, respectively, to receive. If the Secretary of the Interior shall withhold a certificate from any state or territory of its appropriation the facts and reasons therefor shall be reported to the President, and the amount involved shall be kept separate in the treasury until the close of the next Congress, in order that the state or territory may,

if it should so desire, appeal to Congress from the determination of the Secretary of the Interior. If the next Congress shall not direct such sum to be paid it shall be covered into the Treasury. And the Secretary of the Interior is hereby charged with the proper administration of this law.

"SEC. 5. That the Secretary of the Interior shall annually report to Congress the disbursements which have been made in all the states and territories, and also whether the appropriation of any state or territory has been withheld, and if so, the reasons therefor.

"SEC. 6. Congress may at any time amend, suspend, or repeal any or all of the provisions of this act."

American Wild-flower Club. It is gratifying to know that at least some organized attempt has been made to protect the native plants of the country. The American Wild-flower Club was organized a year or two ago, and its labors appear to meet with favor in all directions. The history and scope of the organization are told in the following extracts from one of its publications:

"Its *raison d'être* was the desire on the part of an American woman, compelled by circumstances to make her home in England and reproached persistently by returned British tourists with the unbeautiful aspect of 'civilized' American landscape—its barren pastures and weedy hillslopes, its desolate waysides and despoiled thickets—to see if something could not be done, if not to re-stock denuded localities, at least to avert so far as possible the extermination of an indigenous flora from regions where it remained as yet unawakened. Her notes on the subject, forwarded to a Philadelphia friend, were read and discussed in a circle of flower lovers in that city, the result of the conference being a determination to undertake the preservation of our better wild growths in methodical fashion through the institution of a system of local clubs, which, knit together, should constitute a national association. While however, the project transmitted from London as a suggestion, thus took definite form in Philadelphia, its authors were alike agreed that the Philadelphia atmosphere, or indeed that of any great metropolis, was not suited to its fuller growth and development. In the words of one of their number, the perpetuation of American wild flowers was a work pertaining essentially to the country. Establish its headquarters in the

midst of a population whose interpretation of the floral kingdom was a bunch of paper roses in the winter and an india rubber plant dominating a bed of pickling cabbage vegetation in summer, and it would inevitably perish of its own inconsistency. The centering point must of course be a city large enough and closely enough in touch with the world and contemporary life to permit of resort to the most approved methods of organization and administration; but such a city required in turn to be set among fruit and flowers and penetrated daily by the influences of nature. Of the various localities falling within range of these stipulations, Wilmington, Delaware, appeared best fitted for the Association's purpose and it was selected accordingly. The secretary's office in this city is in charge of a gentleman well known for his devotion to floriculture.

"These were the preliminaries. That the idea set forth in the tentative essay, 'Shall We Save Our Wild Flowers?' was destined eventually to take root in the public mind its projectors cherished no doubt. But they were content to feel that they must hasten slowly, overcoming much inertia in the course of their progress. They had been confronted with the fact that while whatever in native growths was coarse, rank, vile, whatever was offensive to touch, to sight, to smell, grew and flourished apace; whatever was beautiful, graceful, fragrant, if it had not already vanished beyond recall, was perishing swiftly and surely. At fairs and flower shows held in Eastern cities whose skirting woodlands were within their remembrance fair with arbutus, clematis, cowslip, with orchid and azalea and laurel, they were forced to see that over against the lavish wealth of English, Dutch, German flowers, of flowers from Japan, China, Africa, Australia, there was set not a blossom or plant or shrub indigenous to the soil of the state. But there had appeared to be so willing a submission to this condition of things, such unprotesting acquiescence in the vandal practice of pillaging and plundering every chance spot in which wild flowers yet survived, the stripping bare of each suburban building site, the uprooting of every vine and creeper and shrub from picnic woods and tenting grounds, that to hope for a ready welcome for so 'disturbing' an institution as the A. W. F. C. would have suggested itself as unreasonable.

"But the apparent indifference which they had noted so regretfully, veiled a dormant interest which needed only a word to awaken to sympathetic activity. From the outset the project was everywhere received with eager enthusiasm. Responses poured in from all quarters, suggestions, queries, offers of help and counsel, scraps of experience from those who in their own modest way were seeking to foster the flora of their respective localities. So far as seemed requisite for a beginning, the nature of the club's work and the methods of local organization had been outlined. By the help of these hints, clubs were formed in sections the nearest and the most remote; in Maine, in Illinois, in Pennsylvania, in Tennessee, in Nebraska, in Florida. Before a month's time and almost without effort on the part of its originators, the project of preserving our American wild flowers has passed from the realm of possibilities into that of established facts.

"In the interval which has since elapsed the ground first cursorily surveyed has been gone over more in detail; suggestions have been offered as to the choice of flowers to be perpetuated, the cautions to be observed in their cultivation, the limits and regulations of floral exchange, the formation of plants, nurseries, etc. etc., the whole accompanied by illustrated articles descriptive of the best types of our American flora.

"So long, then, as the official organ of the association, *The Home Journal*, could be supplied them, enquirers were at no loss how to proceed. But the demand has been so great that, despite the publisher's hearty and faithful co-operation, the association has been unable to keep pace with it. Edition after edition has been exhausted until now, with changes in the office of publication, while thousands of letters still wait unanswered, the earlier issues have become altogether unobtainable. At the same time to republish as current matter the mass of essays, editorials and technical articles which have appeared in them and with which club members are already familiar, was for obvious reasons deemed impracticable. To meet the difficulty there, the association decided to embody in pamphlet form the substance of its most important printed matter, adding thereto whatever seemed essential to a clear comprehension of the character and scope of the undertaking to which it stands pledged. Thus revised, these essays—originally prepared by the association's direction and under its

express supervision—constitute a complete hand-book of American Wild-Flower Club work, the perusal of which will enable sympathizers everywhere to bring themselves without further question or instruction abreast of the earliest established clubs."

"The national association A. W. F. C. is a union composed of the various local clubs formed up to date. Its purpose is to facilitate communication between local clubs, to transact business beyond the range of their power or authority, and to further such details of the A. W. F. C. work as can be best furthered through extended combination.

"Local clubs are entitled to admission to the association under the following rules:

"1. No admittance fee shall be charged by the association, nor shall it exact any dues from, nor lay any assessment upon either local clubs or members of the club-at-large.

"2. A local club upon its organization must report through its secretary to the association, giving list of officers and members of the club, upon receipt of which report the secretary of the association will in return forward a certificate of membership for the club as a body, together with cards and badges for each officer and member.

"3. A local club must consist of at least three members.
(a) But any person can become a member of the club-at-large by sending name and address to the secretary of the association.

"4. In towns of less than three thousand population, not more than one club can be formed simultaneously. (a) Members of any local club seceding therefrom and forming a rival local club will not be recognized by the association.

"5. Local clubs dissolving their organization must return certificate of membership and members' cards to the association; also badges of all such members unless such as may elect to join the club-at-large.

"6. A local club will be regarded as in full membership so long as a quarterly report is received from the secretary. Failure so to report will be followed by a suspension from the privileges of the association until such failure is made good.
(a) All matter embodied in local club reports will become the property of the association, which reserves the right to publish it or any portion of it, either in its official organ, or

in book form. (b) But this shall not debar local clubs from furnishing the same matter to the press of their various communities; *Provided*, that it be not given the local press in advance of its forwarding to the association.

"7. Local clubs will be expected to discharge all indebtedness promptly. Neglect to comply with these rules, will, on complaint to the association, be visited by suspension until the obligation is discharged. A club which after having been suspended, shall be a second time guilty of this offense will be dismissed from the association.

"8. Differences occurring among members of local clubs should, so far as possible, be adjusted by the club itself. But should points arise upon which a settlement cannot be had, they may be referred to the association, whose decision in the case will be regarded as final.

"9. Every local club is at liberty to make any by-laws, or formulate any regulations for its government that it may see fit, provided that such local rules do not conflict with the rules of the association.

"10. On and after June 1st, 1890, no rule of the association can be altered or revoked, except at the request of two-thirds of the whole number of local clubs in full membership at the time."

"The primary aim of the A. W. F. C. is the preservation and perpetuation of our best wild flowers. And in manifold instances this can mean to only a very limited extent, either the guarding of them in haunts where they still flourish, or their replacement in localities from which they have already vanished. No care, no watchfulness can meet the contingencies whose effect is to change the face of the region and bring about the disappearance of its indigenous fauna and flora. Trees must be felled, land must be cleared for the plow, marshes and bog meadows must be drained to dryness; hillside and prairie, to-day joyous with bloom, will to-morrow be staked off into building lots. The guide to action here is unmistakably given in the dealings both of the national government and of private agencies, with the surviving types of our aboriginal fauna. Under certain conditions, to be noted later on, we may succeed in re-stocking localities at present denuded, but to insure the perpetuation of our wild flowers, past the hazard of those circumstances which have so widely wrought

this destruction, we must see to it that they cease to be wild. Whatever the specimens we desire to preserve, some specimens of them must be transferred to our own premises, where we can keep guard over their safety, and where they will be, not tenants-at-will but free-holders. Once fairly set as garden growths, the perpetuation is assured. They will become settled inhabitants, as much a detail of bed and border as the pansies and clove pinks, side by side with which they stand, and the same familiar delight to generations of loving eyes 'far on in summers that we shall not see.'

"As a rule, sun loving plants may be relied upon to take most kindly to cultivation; woodland blooms are exquisite in form and tint, but our showiest varieties are flowers of the unscreened open, growing where the sun glares upon, the storms pelt and the winds buffet them, and in their fearless tenacity to life, best calculated to endure the shock of change from savagery to civilization. In the transfer of any flower from the wild to gardens, however, the conditions of its original habitat should, so far as possible, be repeated. Whatever modifications of environment it may in course of time learn to submit to, at the outset of its sophisticated career cinnamon fern will not thrive on a hot sandy hillslope, or Labrador tea in the damp chilliness of a shady border. Neglect of this cardinal precept has, more than any other cause, served to denude suburban localities in the middle and New England states of their flowers and flowering shrubs. Fairmount Park owes to it the disappearance, so deplored by the park botanists, of the exquisite wild azalea and the charming valerian. In like manner free woodlands have been well nigh bared of maiden-hair, evergreen fern, squirrel corn, hepatica, and anemones which—snatched from out a leaf mold, light as toilet powder—have been planted to swift death in a garden soil composed of equal parts of street dirt and angle worms. Begin then with shade for your woodland, sun for your prairie flowers; with moisture for your meadow growth, with sand, or loam or sod for the plant accustomed to draw its life from such a source.

"This repetition of native soils and conditions does not, however, involve the rejection of artificial fertilizers. On the contrary, their effect will often be found to be the imparting of vigor to struggling plants. The application of them likewise

overcomes the tendency to sterility so often observable in bulbous rooted growths, both wild and tame ; while it is upon their use that we must largely rely in our endeavor to augment the size and improve the tints of flowers. Administer them sparingly the first year and increase the quantity as the plants show themselves thriving under it. Flowers thus treated will become neutral minded as to soils, much sooner than will those grown in naturally constituted earth.

“Of our wild flowers the majority are perennials. All such should be kept from seeding until they evidence themselves thoroughly well established. The maturing of seed is a strain on the strength of a plant, which, under unaccustomed conditions it cannot be trusted to survive, and should only be compelled to undergo when, as in annuals and biennials, the seed is necessary to the continuance of the species.

“Another caution which every one should observe is to give the wild growths room, so that they will neither be encroached upon by prior occupants of the garden nor require to be checked or maimed lest they crowd too closely upon one another. American wild flowers are characterized by singular fineness and delicacy of leaf growth. It would be difficult to name a really superior variety the foliage of which is coarse or rank. But should any transplanted flower take so kindly to its new home as to spread overfast, there is but one safe method of reduction—uprooting. It is a too common blunder of amateur florists, pushed for space, to temporarily chasten the exuberance of their spring flowering perennials, by cutting down to the ground at the end of the blooming season, but the blunder is one which they generally have cause to rue. Only exceptionally tenacious lived plants bear to be thus deprived of their breathing apparatus, and those which do outlive it are always weakened as to leafage and paled and impoverished as to bloom.”

In this connection it is interesting to notice that Professor T. J. Burrill, of the Illinois Industrial University, has started a movement to induce the Illinois Central Railroad to take measures to preserve the native flora along its lines.

Societies. Horticultural organizations are rapidly increasing in number and extending in usefulness, especially those of a trade or semi-trade character. The national conventions of the year were seven in number, as follows: Columbian Horti-

cultural Association, Chicago, Aug. 27; American Association of Nurserymen, New York, June 4-6; Society of American Florists, Boston, Aug. 19-22; Association of American Cemetery Superintendents, Boston, Aug. 19-22; American Seed Trade Association, Saratoga, June, 10 and 11; Cider and Cider Vinegar Makers' Association of the Northwest, St. Louis, Dec. 16 and 17; American Cranberry Growers' Association, Philadelphia, Aug. 26.

The Columbian Horticultural Association is a body organized to further the horticultural interests of the Columbian Exposition. The initial movement was made by the executive committee of Illinois State Board of Horticulture, in convention at Sailor Springs, Illinois, in July, 1890. This committee issued a call July 30th for a delegate convention of all horticultural organizations in the United States, to meet at the Sherman House, Chicago, August 27th. The full proceedings of this convention, which resolved itself into an association to exist until the close of the exposition, will no doubt soon become so valuable as to warrant their record here. I choose the following report from the *Orange Judd Farmer*:

"Pursuant to call, the horticulturists of the country met in delegate convention at the Sherman House, Chicago, August 27. Order was called by Jabez Webster, President of the Illinois State Horticultural Society, and the object of convening made known, after which, John Thorpe, of Pearl River, N. Y., was elected president *pro tem*, and A. C. Hammond, of Warsaw, Ill., secretary *pro tem*. The committee on credentials—N. H. Albaugh, Tadmor, O., J. C. Vaughan, Chicago, C. L. Watrous, Des Moines, Iowa—reported the following as being entitled to representation:

"American Pomological Society, G. B. Brackett, Denmark, Iowa; American Horticultural Society, Parker Earle, Ocean Springs, Miss., and W. H. Ragan, Greencastle, Ind.; Society of American Florists, John Thorpe, Pearl River, N. Y., and E. G. Hill, Richmond, Ind.; The American Association of Nurserymen, James D. Reynolds, Riverside, Ill., and S. M. Emery, Lake City, Minn.; The American Seed Trade Association, J. C. Vaughan and S. F. Leonard, Chicago; The Ohio and Mississippi Valley Horticultural Association, Geo. W. Endicott, Villa Ridge, Ill.; Arkansas State Horticultural Society, S. H. Nowlin, Little Rock, and John Karr, Little Rock; Colorado State Bureau of Horticulture and Forestry, W. D. Osborn, Loveland; Delaware and Maryland Peninsular Horticultural Society, Wesley Webb, Wilmington, Del.; Indiana State Horticultural Society, Prof.

J. Troop, Purdue University; Iowa State Horticultural Society, C. L. Watrous, Des Moines, and G. B. Brackett, Denmark; Illinois State Horticultural Society, Jabez Webster, Centralia, and A. C. Hammond, Warsaw; Central Illinois Horticultural Society, G. W. E. Cook, Lacon, and F. I. Mann, Gilman; Southern Illinois Horticultural Society, E. A. Riehl, Alton, and Wm. Jackson, Godfrey; Northern Illinois Horticultural Society, Arthur Bryant, Princeton, and Andrew Dunning, Chicago; Kansas State Horticultural Society, Judge L. Houk, Hutchinson, and F. Wellhouse, Fairmount; Kentucky State Horticultural Society, Wm. L. Dulaney, Bowling Green; Massachusetts State Horticultural Society, Benjamin G. Smith, Cambridge, and O. B. Hadwin, Worcester; Michigan State Horticultural Society, R. Morrill, Benton Harbor, and C. J. Monroe, South Haven; Missouri State Horticultural Society, L. A. Goodman, Westport; Nebraska State Horticultural Society, G. J. Carpenter, Fairbury, and F. W. Taylor, Omaha; Northwestern Pennsylvania Horticultural Society, H. B. Beatty, Oil City; Ohio State Horticultural Society, N. H. Albaugh, Tadmor, and N. Ohmer, Dayton; South Dakota State Horticultural Society, Oliver Gibbs, Jr., Ramsey; Wisconsin State Horticultural Society, B. S. Hoxie, Evansville, and M. A. Thayer, Sparta; Bureau of Pomology, Department of Agriculture, Washington, D. C., H. E. Van Deman; Chicago Floral Club, Frank Bentley, Chicago, and G. L. Grant, Chicago; Indiana Florists' Society, J. D. Carmody, Evansville; Indianapolis Floral Club, Wm. Langstaff, Indianapolis, Ind.; Cook County (Ill.) Horticultural Society, Edgar Sanders, Chicago; Northwestern Cider and Cider Vinegar Makers' Association, L. R. Bryant, Princeton, Ill.; Tri-City Floral Society, J. Temple, Davenport, Iowa; Illinois Fruit Growers' Association, N. M. Burns, Clay City, and Israel Mills, Clay City; West Michigan Fruit Growers' Association, Joseph Lannin, South Haven, and Walter Phillips, Grand Haven; The Warsaw (Ill.) Horticultural Society, J. T. Johnson, Warsaw; Marshall County (Ill.) Horticultural Society, E. R. McKinney, Lacon; and Honorary Members, E. S. Goff, Madison, Wis., Henry C. Freeman, Alto Pass, Ill.

"While awaiting above report, the convention listened to an interesting paper from A. C. Hammond, secretary of the Illinois Horticultural Society, which set forth an informal outline of plans, etc., regarding horticultural exhibits at the World's Fair.

"Permanent officers were elected as follows: President, S. M. Emery, Lake City, Minn.; vice-president, C. L. Watrous, Des Moines, Iowa; secretary and treasurer, H. B. Beatty, Oil City, Pa.; assistant secretary, G. L. Grant, Chicago.

"An informal talk followed, touching the exhibit. H. E. Van Deman, of Washington, D. C., said: 'The horticultural exhibit should be cut loose from the agricultural exhibit; though twins, they should be separate in order to do each justice. Horticulture covers the universe, and the wise course to pursue is to appoint a commissioner of horticulture, with

four superintendents of departments—1, floriculture; 2, pomology; 3, nursery and forest; 4, seeds and vegetables.' On motion by Hon. C. L. Watrous, the following gentlemen were unanimously elected by ballot to the positions indicated, subject to approval by the National Commission and Local Directors of the World's Fair: Commissioner of Horticulture, Parker Earle, Ocean Springs, Miss.; Supt. of Floriculture and Landscape Gardening, Jas. D. Reynolds, Riverside, Ill.; Supt. of Pomology, G. B. Brackett, Denmark, Iowa; Supt. of Nursery and Forest products, Geo. B. Thomas, West Chester, Pa.; Supt. of Seeds and Vegetables, J. C. Vaughan, Chicago. A committee was appointed, with President S. M. Emery chairman, to formulate and present an address, as to action of this meeting, to the executive department of the Columbian Exposition.

"Horace J. Newberry, alternate for Kansas, offered the following resolution, which unanimously prevailed:

"*Resolved*, That this organization be known as the Columbian Horticultural Association, and that the advisory executive committee consist of the president and secretary, and Messrs. Parker Earle, G. B. Brackett, James D. Reynolds, J. C. Vaughan and George B. Thomas, and that the Association remain an active organization until the close of the World's Columbian Exposition, and that all elected officers be permanent until said expiration.

"Oliver Gibbs, Jr., presented the following resolution, which was carried:

"*Resolved*, That delegates from state and other societies now existing in America, entitled to representation under the call of this meeting, shall be admitted and enrolled by the secretary, on presentation of proper credentials to the executive committee at any future meeting of this association.

"On motion of S. M. Emery, it was

"*Resolved*, That each society here represented be requested to contribute \$25 as a contingent fund for expenses of permanent organization.

"The offices of secretary and treasurer were separated, and M. A. Thayer, Sparta, Wis., elected treasurer. By appointment, Vice President Bryan met members of the association at the Sherman House, Thursday, 9 A. M., when all proceeded to visit and view the different sites offered for

World's Fair purposes. The journey was replete with incidents, and frequent individual preference was made, but as an association no decision was put on record. Adjourned, subject to call of the president."

The horticultural features of the Columbian Exposition have occasioned much discussion, but no definite arrangements had been made at the close of the year, and the director, or commissioner, had not been chosen. *The American Garden* has urged* that an international congress of horticulture be assembled at the exposition, and that the opportunity be seized to make a comprehensive study and report of our horticultural industries. There is every reason to expect that the occasion will afford one of the best exhibits of horticultural products ever made.

The leading papers and discussions of the various societies are here presented as showing the trend of the year's inquiries.—

American Association of Nurserymen :

New Fruits—H. E. Van Deman.

Root-Grafting and Budding—L. H. Bailey.

Can Stock be Dug and Shipped too Early in the Fall?—G. E. Meissner.

Does the Future of our Business Look as Promising as the Past?—H. S. Wiley.

Do We Live and Learn?—Thomas Meehan.

The Cause of Low Prices for Nursery Stock—S. M. Emery.

How Can We Best Prevent Duplicates in our Mailing Lists?—J. T. Lovett.

Advertising—G. J. Carpenter.

Looking Backward (poem)—N. H. Albaugh.

Grapes, their Character as affected by Climate and Situation—Geo. W. Campbell.

Transplanting Evergreens—Fred. W. Kelsey.

Peach Culture—J. H. Hale.

Are Hardy Plants Desirable for our Catalogues?—J. W. Manning, Jr.

Chestnut Culture—Samuel C. Moon.

The Relation of Nurserymen to the Forestry Problem—B. E. Fernow.

Pear Leaf Blight, its Cause and Treatment—B. T. Galloway.

Nurserymen, Agents, Tree Peddlers and Humbugs—George J. Kellogg.

Fruits for the West and North—J. L. Budd.

The Nursery Outlook in England—Wm. Fell.

Society of American Florists :

The Growing Importance of the Easter Trade, and how to Prepare for it—James Dean.

* xi. 234 (Apr.), 295 (May), 423 (July), 555 (Sept.).

- The Value of System in Business—D. B. Long.
 Best Method of Treating Callas during Summer to have them bloom for the Holidays—E. M. H. Edwards.
 Marketing Cut-Flowers—J. D. Raynolds.
 Is the Selling of Flowers through Commission Men the best possible Plan of Marketing our Produce?—Frank Huntsman.
 Berry-bearing Plants for Decorative Purposes—Robert Veitch, Jr.
 Twenty-five Indispensable Plants for the Extreme South—R. D. Hoyt.
 Fertilizers Under Glass—Professor S. T. Maynard.
 Succulents—E. S. Miller.
 Best Twenty-five Hardy Herbaceous Plants for Florists' use—J. Woodward Manning.
 Can Hellebores be Grown to Advantage by the Commercial Florist?—William Falconer.
 Can We Reasonably Expect a Race of Early Chrysanthemums, Blooming in September and October, Valuable for America?—John Lane.
 The Twenty Best Native Plants for Florists' use—A. Gilchrist.
 Nomenclature—W. H. Manning.
 Review of Plants of Recent Introduction—W. P. Simmons, E. G. Hill, John Thorpe.
 Petroleum as Fuel—Jos. B. Moore, and B. P. Critchell.
 Florists' Business in Louisiana, 1889-'90—R. Maitre.
 Crossing and Hybridizing—E. S. Carman.
 Peter Henderson—A. D. Cowan.
 John Henderson—John H. Taylor.
 Overhead Heating—L. Wight.
 General Discussion of Landscape Gardening, evoked by William McMillan's paper of last year.*
 Report of Nomenclature Committee, giving an extensive list of synonyms.

Association of American Cemetery Superintendents:

- Life of Adolph Strauch—F. Eurich.
 Cemetery Roadways—G. Troup.
 Mistakes in Cemeteries—A. W. Blaine.
 What Trees and Shrubs to Plant in Cemeteries, and when to Plant Them—Wm. Salway.
 What Trees and Shrubs Should We Plant in Cemeteries? Where Should They be Planted?—O. C. Simonds.

* *Annals Hort.* 1889, 34.

PART II.

SPECIAL ANNALS.

§ 1. *INTRODUCTIONS OF 1890.*

A LIST OF THE FRUITS, VEGETABLES AND ORNAMENTAL PLANTS
INTRODUCED INTO AMERICAN TRADE DURING THE YEAR.

The following list is a record of the novelties of the year, so far as it has been possible to obtain them. The greatest pains have been taken to make the list complete and accurate. Nearly all the introducers whose names appear in the list have been consulted, and experimenters and others have aided in the preparation. It cannot be hoped, however, that the list is complete, but it is certainly sufficiently ample to possess value as a historical record and as a basis for many interesting calculations.

The compilation of such a list is peculiarly difficult, not only because of the widely scattered material but because of the unsatisfactory aid which is often rendered by introducers themselves. These parties often send in lists of introductions for the year containing plants which they had introduced and catalogued in a previous year, and many times the information concerning the novelties and their history is so inadequate or uncertain that definite record cannot be made of it. Many dealers decline or neglect to give information, and to these difficulties must be added the unsystematic methods of entering novelties in catalogues, by which it is often impossible to determine when the plant was introduced, for the same

"novelty" even though "entirely new", may remain in the "novelty pages" of the catalogue for two or three or more years; and a direct application to the dealer may elicit no information. All this difficulty is no doubt, for the most part, a simple indifference to any rigid or systematic attempt towards a yearly record, and it has its origin in the life-long half careless methods of introducing novelties.

It is often difficult, also, to determine when a plant is "introduced," as I pointed out last year (*Annals*, 1889, 96). Sometimes plants have been widely distributed from friend to friend long before they are offered for sale; some are advertised in catalogues one year, but not actually sold until the next; sometimes plants are re-introduced, after having dropped from sight; some are introduced in Europe a year or two before reaching this country, and many are widely known among experimenters and from reports in the press before appearing upon the markets. To avoid as many as possible of these difficulties I have attempted to record only the date of introduction into "American trade."

There is no attempt whatever towards any revision of names or the determination of synonyms, as the purpose of the list is a simple record of the activities of the year. I have attempted to give a brief description of the plants, obtained from the originator or introducer. These descriptions are simply such as I have been able to collect, and in no case can I vouch for their accuracy.

The list contains 575 plants, against 434* in the list for 1889. This increase of 141 varieties is due in part to the more thorough canvas of the field which I have made this year, but I am of the opinion that greater activity was shown in the introduction of new varieties in 1890 than in 1889, particularly in the case of some vegetables. The most remarkable circumstances common to nearly all these novelties is the assurance that perfection has been reached, that every old variety has been out-done, and that the new comer just fills the niche which was void. The English language is commonly taxed to its utmost to express the superlative virtues of the claimants, particularly among vegetables, and in order to emphasize beyond the power of expression, epithets are frequently piled

*Omitting ten chrysanthemums marked '6 1890."

upon each other until the impression is made by mere weight of letters and words. I do not wish to criticize all this. I only wish to ask my reader ten years hence, or even five years—if I should be so fortunate as to have one then—to count up the number of the varieties in this list which have won public favor.

Acacia mollissima. *Schlegel & Fottler.*

— pendula. *Kelsey.*

A very fine and hardy acacia, of distinct weeping habit, and resembling the weeping sophora; foliage a delicate light green, exceedingly graceful and pretty. England.

Allium, The Bride. *Buckbee.*

Almond, Commercial. *Leonard Coates.*

— Hatch's No. 1. *A. L. Hatch.*

— Texas Prolific. *W. R. Strong Co.*

Andromeda Japonica, aurea. *Temple & Beard.*

From France.

Apple,

— Akin's Red. *Ill. State Hort. Society.*

— Black Annette. *A. Branson.*

— Bostick Queen. *Wm. Hy. Smith.*

— Coppleton (sweet). *Coppleton, Mich.*

— Cullin's Keeper. *Griesa, Kansas.*

— Dr. Walker. *Downer.*

— Early Sweetheart. *Stark Bros.*

— Elkhorn. *Kennan.*

— Family Favorite. *Stark Bros.*

— Gloege. *Gloege, Wisconsin.*

— Gracie. *P. M. Gideon, Minn.*

— Jones' Seedling. *Wm. Hy. Smith.*

— Marshall Red. *Leonard Coates.*

— Mason's Orange. *Griesa, Kansas.*

— Poorhouse Greening. *Wm. Hy. Smith.*

— Princess Louise. *Smith & Kerman, St. Catharines, Ont.*

— Ragan's Yellow Horse. *Wm. Hy. Smith.*

— Rainbow. *Stark Bros.*

— Red Riches. *Stark Bros.*

— Ronk. *Albertson & Hobbs.*

— Sonoma. *Leonard Coates.*

— Spencer. *Stark Bros.*

Apricot, Acme. *G. J. Carpenter Co.*

A new apricot from northern China, which was given to Professor J. L. Budd by a returned missionary. The tree is an immense grower, very hardy and productive; fruit the very largest size; a sweet and delicious freestone, yellow, with red cheek.

Aquilegia chrysantha, alba. *Henderson.*

Flowers pure white.

Arbor Vitæ, Stark's American Golden. *Stark Bros.*

Argyreia tiliæfolia, or Mammoth East India Climber. *Henderson.*

A perennial climbing plant of high and rapid growth; large green heart-shaped leaves, silvery white underneath; very large flowers of white and violet.

Arnebia cornuta, or Arabian Summer-Flowering Primrose. *Henderson and others.*

Discovered by Dr. Regel. The plant grows in bushy form, about two feet high and about the same breadth. It blooms with unusual profusion during the whole summer. Flowers over $\frac{3}{4}$ of an inch across, and of a rich primrose yellow, marked with five black spots; the spots change on the second day to a rich maroon, and on the third day vanish, leaving the flower a clear, bright yellow. Annual.

Aster, Surpasse Triomphe, or Scarlet Triumph White-Edged. *Henderson.*

A new variety of Perfection aster. The flowers are large, frequently measuring five inches across, perfectly double, of a brilliant crimson purple, each petal being margined with white. The plants are very dwarf, and bloom profusely.

Azalea mollis, *Sinensis*. *Kelsey.*

Double, hardy, bright yellow. Holland.

Bean, Buist's Lightning Early Valentine. *Buist.*

— Burpee's Saddle Wax. *Burpee.*

— Ely's Prolific Dwarf Wax. *Ely.*

— Griswold's Everbearing Wax. *Johnson & Stokes.*

A bean bearing handsome round yellow pods, which are thick, fleshy, entirely stringless, growing six to seven inches in length, and rich, buttery and fine flavored when cooked. Bears in great abundance throughout the season. The stalk is stiffer and branches out more than other beans. The beans are a fine kidney shape, and very distinctly marked. Thos. Griswold, S. Wethersfield, Ct., originator.

— Livingston's Improved Six Weeks. *Livingston.*

An early strain of the old Six Weeks.

— New Union White Valentine. *Johnson & Stokes.*

Earlier and of a dwarfer habit than the old White Valentine, the pods being rounder, smoother, plumper and more meaty, and entirely

stringless, remaining in a tender cooking condition longer than any other green-podded variety. The beans, when ripe, are pure white.

Bean, Ruby Dwarf Horticultural. *Rawson.*

A strong grower (similar in this respect to the Goddard), and produces large, broad, well-filled pods, somewhat flattened, and of a very dark ruby color.

— Saddleback Wax. *Landreth.*

A golden-podded wax variety, introduced for the first time in the autumn of 1889. Named Saddleback by reason of the peculiar form of the pods, which on the back are unusually broad, flat and indented with a decided crease, so much flattened on back and front as to have the greatest thickness or diameter from side to side, which peculiar quality cannot be pointed out for any other bean. Produces edible pods as early as Black Wax, nearly twice as large, rounder, more pulpy and absolutely stringless. More prolific than any other bean, harder than Black Wax or Golden Wax, and rust-proof.

— Stokes' Evergreen Lima. *Johnson & Stokes.*

The result of several years' selection from Salem Mammoth. Not only holds the full size and great productiveness of the Salem Mammoth, but has the additional quality of holding entirely the deep green color of the unripe or green state in all stages of growth and even when dry and shelled.

— Thorburn's Early Refugee Wax. *Thorburn.*

A perfect Refugee with wax pods. Pods long and yellow.

— Washington Market Lima. *Barnard.*

Earlier, more productive and of finer flavor than any of the ordinary limas. The pods are long and contain five or more beans of unusually large size when in the green state. Originated near Washington, D. C.

Beet, Dirigo Turnip Blood. *Kendall & Whitney.*

A rich, blood-red beet, of fine grain and flavor, and is earlier than either the Egyptian or Eclipse. It originated with a leading market gardener, and was brought to perfection after ten years of careful cultivation.

— Mitchell's Perfected Earliest Dark Red Turnip. *Johnson & Stokes.*

It has the color and small top of the Egyptian, but it is tender, sweet and juicy, even after it has lost its leaves from age. (Same as Mitchell's Dark Red Turnip of last year?)

— New Half Long Blood. *Ferry.*

The roots are only half as long as the Long Blood, but weigh as much on account of their thickness. They are always smooth and handsome, and their rich, dark red flesh is very sweet, crisp and tender, never becoming woody, even in the exposed portion.

— Yellow Leviathan Mangel Wurzel. *Ferry.*

Most field beets are liable to one of two faults: either they are so

small and lacking in vigor as not to give a good crop, or if large they grow so coarse and with such large neck and top that the flesh is coarse and comparatively valueless. This variety is an improvement in these respects. It is uniformly well shaped, and very large, being the most productive of any. It grows half out of the ground and is easily harvested, yet never becomes woody. The white flesh is sweet and tender.

Begonia, Dewdrop. Robert Scott & Son.

A seedling begonia raised by W. J. Chinnick, of Trenton, N. J. It is a dwarf, compact-growing variety. The foliage is bright glossy green, with shell-shaped leaves and stems of light crimson. The blooms are produced in clusters of from six to eight florets, which are satiny white, with golden yellow stamens. When floated out in the sun during the summer, the color changes to a delicate shade of pink, with crimson stems, making a beautiful contrast. It is a profuse bloomer.

— *Scharffii. Schlegel & Fottler.*

Berchemia racemosa. Saul.

Buphane toxicaria. Reasoner Bros.

South Africa.

Cabbage, Bismarck. Childs.

— *Louderback's All Year Round. Johnson & Stokes.*

This cabbage originated with Daniel Louderback, of Philadelphia. It is not only the finest Early Drumhead, but is equally as good for second and third early, intermediate and late. It heads large and solid, with very short stem and few outer leaves.

— *New Diamond Winter. Johnson & Stokes.*

Very compact, the stem short, and does not crack. The heads will average from 15 to 18 pounds in weight after they are trimmed for market. Extra hard, solid, round and somewhat flattened on top; possesses a fine, small rib. Long Island.

— *New Race Horse. Buckbee.*

Calliopsis, New Double. Childs.

Callitris robusta. Reasoner Bros.

Cypress pine. Australia.

Campanula punctata, New Spotted Bell Flower. Henderson.

An elegant hardy perennial, about 1½ feet high. Flowers numerous, pendulous, bell-shaped, milk white, dotted and striped with red on the inner surface, and as large as the well known Canterbury Bells, and are produced the entire season.

Canna Childsi (The Tiger Canna). Childs.

It is of a rather dwarf habit, shorter than either Ehemanni or Noutoni. Its foliage is rank, and of a light green shade. The flowers are borne in large, compact panicles, are of a large size and perfect shape, with broad petals, and of a bright glossy yellow color, thickly spotted with crimson. Seedling from one of Crozy's.

Canna, Crozy's for 1890, introduced by various dealers:

Admiral Courbet, Ampere, Antoine Chantin, Antoine Crozy, Commandant Dubuis, Enfant du Rhone, Francois Corbin, Francoise Lapente, Gen. de Negrier, Geoffroy St. Hillaire, Goury, Isaac Casati, Jacquemet de Bonnefond, Jules Chretien, Louis Chretien, L. Christen, Mad. Antoinette de Allemary, Mad. Liabaud, Mme. Oriole, Petit Jeanne, Princess Lusignani, Professor David, Souv. de Asa Gray, Souv. de Jeanne, Charieton, W. Pfitzer.

Carnation, Constancy. *Chas. T. Starr.*

A child of the Century, containing blood of Portia, possessing its color with larger flowers, not running to so many small, inferior florets as does its parent, after the first flush of fall bloom. It is a glowing scarlet, fringed; growth strong and healthy, dark green and luxuriant, and will exceed Portia in the number of long-stemmed blooms to the same space occupied.

— Golden Gate. *Chas. T. Starr.*

A seedling of Hinzie's White, fertilized with Field of Gold. The plant has the characteristics of Hinzie's, but more dwarf in stalk, and is early flowering. It is a deep golden yellow, without any stripe or foreign color; healthy and free.

— J. R. Freeman. *Chas. T. Starr.*

A seedling of Century, crossed with Anna Webb; exceedingly profuse. Flowers almost all on long stems, full and double; does not burst, and is a rich cardinal crimson color; clove scented.

— Lasandria. *Chas. T. Starr.*

Peculiarly a long-stemmed pink, like Portia, which it resembles in manner of growth and style of flower, but of a rich carmine color; early and free.

— Marguerite. *Henderson.*

The flowers are of brilliant colors, ranging through many beautiful shades of reds, pinks, white, variegations, etc.; they are of perfect form and large size, and the calyx never bursts. They bloom in about four months after sowing the seeds; they come eighty per cent. double. The plants are dwarf, much branched, compact and robust in habit, consequently supporting themselves without the use of stakes.

— Pomona. *Chas. T. Starr.*

Low growing, like L. L. Lamborn, and adapted to benches near the glass. It is of a deep crimson color, of great substance. Flowers will keep a long time, and are borne on single, stiff, upright stems that do not need supporting. Foliage always healthy and vigorous; of a bluish green color.

— Wm. F. Dreer. *Chas. T. Starr.*

Seedling of Buttercup, fertilized with Century. Is of exceedingly strong healthy growth, upright and robust, retaining the style of flower of Buttercup; has a majority of long stems. Its color is a beautiful rose pink; deeply-fringed petals, very large, often three inches in diameter, and does not burst.

Carrot, New French Bellot. *Thorburn.*

A new strain, of superior quality, being in size between the Extra Early Forcing and Early Horn varieties.

— **Rubicon Half Long. *Johnson & Stokes ; Barnard.***

Earlier than the Danvers, and about the same length ; the leaves are one-third shorter, fewer and finer. It grows without neck, the crown is hollow, and it grows well under the ground, which prevents it from becoming sun-burnt. Connecticut.

Cauliflower, Fottler's Improved Erfurt. *Schlegel & Fottler.*

— **New Dwarf Danish. *Schlegel & Fottler.***

Celery, Dilks' Many-Hearted. *Johnson & Stokes.*

It originated with George Dilks, Philadelphia, from one stalk found growing in a field of Golden Dwarf, in 1884. It is very distinct in appearance, being much stouter, thicker and heavier near the root than any other variety.

— **New Giant Pascal. *Thorburn ; Henderson.***

The result of selection from Golden Self-Blanching. It partakes of the nutty flavor of that variety. About two feet high, with stalks that are solid, crisp, not stringy, very large and broader than those of any other. Before blanching it is green, with heart of a golden yellow and very full. It is very easily blanched, requiring only five or six days earthing up, while its preservative qualities make it a fine shipper.

— **Schumacher. *Thorburn.***

Of immense size, very solid and crisp, with light green foliage and golden-yellow solid heart. It will keep in splendid condition all through the winter and into the spring.

— **Thorburn's Heart's-Content. *Thorburn.***

Half-dwarf, with light green foliage, with large, solid and crisp golden stalks.

Centaurea Cyanus fl. pl. *Henderson.*

Cephelandra palmata, Scarlet Fruited Palm-leaved Climber. *Henderson.*

A rapid-growing climber from south Africa, growing about 30 feet high. The vines are long, slim and straight, bearing very large palmate light green leaves. Flowers large, reddish orange, succeeded by small, bright carmine, cucumber-shaped fruits.

Cherries, Belle Montreuil. *Williams.*

— **Black Mastodon. *Leonard Coates.***

— **California Advance. *Leonard Coates.***

— **Purity. *Leonard Coates.***

— **Thompson Tartarian. *Leonard Coates.***

Chestnut, Cut-leaved. *Kelsey.*

A form of the Spanish, having large handsome green foliage of deeply lobed finely cut leaves. France.

Chestnut, Variegated. *Kelsey.*

A new type of the Spanish Chestnut, with large, bold foliage, strikingly variegated with bright yellow. England.

Chrysanthemum, Arizona. *U. S. Nur.*

Japanese. Dwarf and stiff stems, flowers composed of tubular petals on the outside, and flat incurved in the center, light chrome color.

— Bohemia. *U. S. Nur.*

Large reflexed flowers of deep Venetian-red color, supported on stout stems; last long in perfection; considered the best red chrysanthemum.

— Bruinhild. *H. P. Walcott.*

Japanese. Incurved very large flower of unusually broad petals, brown-red on inside, yellow on outside surface, florets partly tubular and closely incurved.

— Carrie Denny. *Hill & Co.*

Clear amber; comes in large spherical balls, incurving and slightly whorled.

— Charles A. Reeser. *Hill & Co.*

Recurved; rosy pink, with lighter shadings.

— Clara Rieman. *Hill & Co.*

Rich lavender rose in color, shading to silvery rose, with a white center. A very large open-surfaced flower of fine texture.

— Connecticut. *U. S. Nur.*

Of the same robust constitution as Bohemia. The flowers are large, with twisted petals of deep madder, the tips white.

— Cortez. *H. P. Walcott.*

Japanese. Incurved, large flowers of stiff broad petals of mahogany color inside, lighter on the outside.

— Crown Prince. *Hill & Co.*

Flower very large; petals very broad. Color ox-blood red on upper surface; old gold beneath. Fine incurved form; early bloomer.

— Edwin Lonsdale. *H. Waterer.*

— Elliott F. Shepherd. *U. S. Nur.*

Japanese. Very large flowers, petals broad and ribbon-like, of beautiful lemon color.

— Gipsy. *Harry E. Widener, Hill & Co., H. Waterer.*

Bright lemon yellow in color, without shadings. Flower large, on stiff, stout stem; incurving, petals crisp and stiff; very free in growth.

— Huron. *H. P. Walcott.*

Japanese. Large flowers of delicate mauve florets, tubular, dilated at extremities, and incurved.

Chrysanthemum, Indiana. *U. S. Nur.*

Japanese. Large flat flowers showing the center of a rich crimson-lake color.

— Iona. *U. S. Nur.*

Reflexed flower made of tubular, deep rose petals. Stems stiff, leafy to the flower.

— Iowa. *U. S. Nur.*

Chinese. Fine, perfect formed flower, white tinted mauve at the ends. Stems stout, leafy to the flowers.

— Iroquois. *U. S. Nur.*

Japanese. Large flowers, petals tubular, flat at the ends, magenta-red, setting off the nankeen-yellow center.

— Ithaca. *U. S. Nur.*

Japanese. Flowers full, outside petals tubular, inside florets twisting spirally; rose color.

— Jean Humphrey. *U. S. Nur.*

Japanese. Large flowers of a fawn color, outer petals long, tubular with spatulate ends, the inner incurved of a fawn color.

— John Lane. *Hill & Co.*

Color a rose pink with peach or light shadings on underside of petals, ends of center petals tipped with gold. Flowers borne on long, stiff, stout stems.

— Kansas. *U. S. Nur.*

Japanese. Petals drawn together at the ends as if bunched, color sulphur yellow.

— Kearsarge. *U. S. Nur.*

Chinese. Flowers light mauve supported on stiff, leafy stems.

— Landon Humphrey. *U. S. Nur.*

Japanese. Flowers of the same shape as Ithaca, but much deeper rose color.

— Manitou. *H. P. Walcott.*

Japanese. Large flowers, florets clear white, incurved, not quite covering yellow center. Catalogued in *Annals* for 1889.

— Minnewawa. *U. S. Nur.*

Incurved Japanese. Large flowers of fine mauve color, good stiff stems, and good foliage.

— Miss Mary Weightman. *Hill & Co.*

Distinct chrome-yellow, form loose and feathery, large and full. Flowers ten inches across. Early.

— Model. *H. Waterer.*— Mohawk. *U. S. Nur.*

Japanese. Large red flowers, rather flat.

— Molly Bawn. *Hill & Co.*

Sport of *Syringa*. Pure white.

Chrysanthemum, Moonstone. *H. P. Walcott.*

Japanese. Large; irregular, flat flower, with broad silver-white pointed petals.

— Mrs. Charles Dissel. *H. Waterer.*

— Mrs. Cornelius Vanderbilt. *U. S. Nur.*

Japanese. Flowers very large, composed of a number of long petals of rose madder.

— Mrs. Edmund Smith. *Hill & Co.*

Pure white; long, narrow, interlaced petals; great substance and lasting quality.

— Mrs. Frank Clinton. *H. Waterer.*

— Mrs. Grace Hill. *U. S. Nur.*

Incurved Japanese. Good form and substance, of a delicate bluish color.

— Mrs. Hicks Arnold. *U. S. Nur.*

Japanese. Flowers very large and deep, of beautiful soft rose color; dwarf grower, the stiff stems being leafy to the flower.

— Mrs. J. T. Emlen. *Hill & Co.*

Deep blood-red on upper surface of petals, underside old gold. Flowers large, incurved, of splendid shape.

— Mrs. Libbie Allan. *U. S. Nur.*

Japanese. Incurved, well formed, large yellow flower not unlike Mrs. W. K. Harris.

— Mrs. Minnie Wanamaker. *H. Waterer.*

— Mrs. Winthrop Sargeant. *Hill & Co.*

Bright straw color, incurved, carrying its flowers on long stiff stems. Very large.

— Oneida. *U. S. Nur.*

Chinese. Full flowers, of a fine light pink color.

— Osceola. *H. P. Walcott.*

Japanese. Quite large flowers of irregular shape of a great number of long tinted petals, narrow, bright red on inner side, pale yellow on outer surface.

— Passaic. *U. S. Nur.*

Flower loose, composed of white, stiff, standing tubular petals.

— Piquat. *U. S. Nur.*

Japanese. Dark red, curious, tubular, reflexed petals.

— President Harrison. *H. Waterer.*

— Raleigh. *U. S. Nur.*

Incurved Japanese. Buff color tinged with rose; the protruding middle petals are lemon yellow.

— Reward. *H. Waterer.*

Chrysanthemum, Robert S. Brown. *Hill & Co.*

A magnificent dark crimson. Very large.

— Rohallion. *U. S. Nur.*

Japanese. Reflexed, of great depth; petals long, twisted, open at the end, of beautiful dark chrome-yellow, strong grower.

— Semiramis. *H. P. Walcott.*

Japanese. Very large flowers of broad, stiff, incurved petals, maroon-red on inner, pale yellow on outer surface; does not show center.

— Shasta. *H. P. Walcott.*

Japanese. Large spherical blooms of tubular florets of pure white; dwarf growing plant with stiff stems.

— Tacoma. *H. P. Walcott.*

Chinese. Flower of perfect form, incurved; white, slightly tinted with pink in the bud, becoming cream-white when fully expanded; of very large size, full center and broad, stiff petals.

— Tecumseh. *H. P. Walcott.*

Japanese. Very large flower, petals incurved, brown-red on inner surface, light mahogany color on the outside, closely overlapping each other, and do not show center.

— Twilight. *H. Waterer.*— Virginia. *U. S. Nur.*

Chinese. Delicate rose, madder color, perfect flowers, produced on stiff leafy stems.

— White Cap. *H. Waterer.*— multicaule. *Thorburn.*

This dwarf annual bedding plant has hitherto been known in Europe and America only as a botanical curiosity. Though a native of South Africa it has been found to be admirably adapted to our climate. The form of the leaves, the whole habit, length of flower stalk, and the look of the flower itself remind one of the English daisy, but the flowers are of a golden yellow color. In this latitude plants from seed sown as late as the middle of May, bloom from the end of June until frost.

Citron. Varieties introduced from Italy and Sicily by the *Division of Pomology, U. S. Dept. Agriculture:*

Amalphi, Calabria, Cedro vero, Citrus medica, Icompio, Limonziana, Macrocarpa, Pereltone, Pomo d'Adamo, Sorrento, Testi di Turco.

Corn, Sweet, First of All. *Dreer.*

Selection from the Cory, but better and ten days earlier.

— Guarantee. *Johnson & Stokes.*

It grows a good-sized, handsome, white ear; grain very much shrivelled when dry, coming in second early or intermediate, and producing three to four ears on each stalk.

Corn, Landreth Sugar.

Remarkably productive, two ears on every stalk, often three, sometimes four. Stalks two feet shorter than Evergreen, very close jointed; ears set low, large and well filled. Ripens after Concord, eight days earlier than Evergreen.

— Maine. *Kendall & Whitney.*

A twelve-rowed variety, ears of medium size, quite dwarf in habit of growth. It ripens about ten days earlier than Crosby's Early. The pearly white kernels are tender, succulent and of a rich sugary flavor. It remains in a green state a long time.

— New Champion. *Price & Reed.*

Introduced as the earliest large sweet corn. Cob white.

— Potter's Superb. *Mills, Thorn Hill, New York.*

Originated with Rev. W. T. Potter, who has grown it for many years. Offered for trial only in 1890.

— Shoe Peg. *Johnson & Stokes. Breck.*

The stalks are of medium height, without suckers; joints short, and sometimes yield as many as five ears, well filled out. The kernel is small, very long, white and tender, sweet and of a rich juicy flavor; medium late. Grain deep and cob small. Originated at Bordentown, N. J.

— Simpsonia Prolific. *Wilson.*

The ears remain in a good eating condition longer than other kinds. Grows to a medium height, has a strong, stiff, leafy stalk, ripens medium early, often bearing 3 good ears to a stalk, each 10 to 12 inches in length. Originated with Simpson Large, Bucks Co., Penna.

— Stabler's Pedigree Sweet. *Burpee.*

— Thomas. *Delano Moore.*

A very early yellow variety, ears six to nine inches long. Originated in Presque Isle, Me.

Cornus alternifolia, argentea. *Temple & Beard.*

Elegantly marked with pure white, like *C. Siberica, elegantissima*. Sport of our native species found by H. M. Pratt, in Vermont.

— — umbraculifera. *Temple & Beard.*

From Germany.

— brachypoda, variegata. *Temple & Beard.*

Habit upright, branches horizontal or drooping, foliage three-fourths white. From Japan. Very handsome. Tender.

Cucumber, Buckbee's Chef. *Buckbee.*

Size of White Spine; dark green.

— Parisian Prolific Pickling. *Several dealers.*

Very long, slender, cylindrical, densely covered with fine prickles, and deep, rich green in color. The flesh is very crisp and tender, making it one of the best for slicing as well as for pickles. The vine produces its fruit in clusters. France.

Cucumber, Pekin Giant. *Buckbee.*

— Thorburn's New Everbearing. *Thorburn.*

Of small size; very early and productive, and valuable as a green pickler. The vines continue to produce fruit until killed by frost.

Currant, Red Oak. *H. A. Jones, Himrods, N. Y.*

Seedling from Cherry. Originated near Elmira, N. Y. Season later than other varieties; good cropper, perfectly hardy; leaves resembling an oak leaf.

— Saunders. *Wm. Saunders, Ont.*

Cydonia Japonica, pendula. *Temple & Beard.*

A remarkable form of the Japan quince, with habit somewhat like that of *Forsythia suspensa*. Found among imported seedlings at Shady Hill, Cambridge, Mass.

Dahlia, Floral Park Jewel. Colors various. *Childs.*

— Thomas Ware's, introduced by various dealers:

Amphion, Asia, Dorothy, Diadem, Excellent, Florie Fisher, F. W. Strandling, Hertie King, Honoria, Isaac Pitman, J. Humerston, Kate, Lustrous, Major Clark, Margery, Miss Jekyll, Miss Louisa Pryor, Miss Ramsbottom, Mrs. B. S. Liddall, Mrs. Edward Morley, Mrs. G. Reid, Mrs. Jas. Grieve, Mrs. Peter McKenzie, Nelly Cramond, Panthia, Plutarch, Professor Baldwin, Purple Princess, Royalty, Sidney Hollings, Sir Trevor Lawrence, The Ameer, Walter, Zulu.

Daphne Cneorum, majus. *Temple & Beard.*

Larger than the type. Holland.

— — Variegated. *Temple & Beard.*

Foliage bordered with white. Holland.

Date. Varieties introduced from Egypt and Algiers, by the *Division of Pomology, U. S. Dept. of Agriculture:*

Amhat, Amreeyeh, Deylet Nour, Hazaneh, M'Kentichi-Degla, Nakleh-et-Pasha, Rars, Rasheede, Seewah, Sultaneh, Zeb-et-Aled.

Dewberry, Wilson's Mammoth White. *Wilson.*

Originated in Texas.

Dodocatheon Clevelandi, or Giant American Cowslip. *Henderson; Farquhar.*

Perennial, discovered in California, and named by Prof. Edward L. Greene, of the State University of California, in 1888. Stems one foot high, surmounted with from six to ten large, beautiful, cyclamen-like flowers of violet blue, with yellow and black center. It is perfectly hardy, and a beautiful plant for partially shaded situations.

Elderberry, Brainard. *Brandt.*

Fully three times as large as the common elderberry.

Encephalartos brachyphyllus. *Reasoner Bros.*

Natal.

Fig, Capri (Wild fig of Europe). *Division of Pomology, U. S. Dept. of Agr.*; also the following :

A frutti nero, Bianco precoce, Brianzola, Black Brogiotto, Black Dattato, Dattato, Delmatino, Dr. Napoli Tivano, Guiglionna, Lordeialo, Natalino, Prolifero, Rubado, Sanvito, San Piero, Symrna (?), Trojano, White Brogiotto.

Forsythia intermedia. *Temple & Beard.*

A new cross, with habit between *F. suspensa* and *F. viridissima*, and foliage ditto. Very valuable. From Germany.

Garcinia Mangostana. *Reasoner Bros.*

Mangosteen, E. Indies.

Genista Andreana. *Saul.*

Hardy ; flowers golden yellow.

Gentiana, Little Gem. *Buckbee.*

Geranium. The four following introduced by *Childs* :

Jupiter. Enormous double flower of the richest dark vermilion.

Mars. Large, double flower glowing amaranth scarlet, rayed with intense violet scarlet, and orange yellow center.

Venus. Beautiful large single flower of perfect shape, and light orange scarlet color.

Saturn. A beautiful large single flower exactly the color of Mars.

A free grower and great bloomer.

— The following French varieties were offered by various dealers in 1890 :

Boguereau. Large truss, florets more than semi-double, clear damask rose color, with white mark on the upper petals. Very beautiful.

Brutus. Truss of the largest size, with large florets, scarlet shading to soft amaranth. Very free flowering. Single.

Catulle Mendes. Flower very large, double, purplish rose, upper petals carrying large white mark. Plant very free flowering.

Fornaise. Immense truss, large flowers of the most brilliant orange scarlet. Single.

L'Abbe Bourgeois. Enormous truss, with flowers of extreme size, double, bright vermilion color.

La Vestale. Fine umbels, large flowers, quite round, pure white and a very vigorous grower. A splendid white bedder. Single.

M. Berger. Double. Very wide truss disposed in half spherical form, bright rosy shade with capucine shading. Flower holds well.

M. Eiffel. Flowers medium sized, of rosy lake color, with touches of orange. A beautiful color and a plant of fine habit. Single.

M. Moissan. Large truss of double flowers, orange shading to terra cotta. Fine habit.

Soleil Couchant. Plant very free in flower ; flowers large and bright capucine, the nearest approach to yellow. Single.

Gladiolus, California. *Burbank.*

Often double, flowers arranged around the stalk as in the hyacinth. Originated by Burbank.

Gloxinia, Defiance. *Henderson.*

Flowers large and erect and the edges of the petals are delicately fringed. Foliage very rich and veined with silvery white. It comes about 95 per cent. true from seed.

Godetia, Stray Beauty. *Buckbee.*

Creamy white, shading to pink.

Gooseberry, Pearl. *Smith & Kerman.*

— Prairie. *Nehring, Ill.*

Gourd, Carsley. *Delano Moore.*

Offered for 1890, but an accident to the seed prevented its introduction.

Grape, Campbell. *T. V. Munson.*

— Colerain. *Colerain Grape Co.*

Vine a strong, healthy grower, of marked *Labrusca* type; perfectly hardy and free from disease, showing no tendency to rot or mildew wherever tested. An abundant bearer; very early, ripening from the 15th to the 30th of August, and hanging a long time on the vine. Bunches and berries medium size; bunches shouldered; color light green, with a delicate white bloom; skin very thin and tender; flesh very juicy and remarkably sweet, fairly vinous, generally but one small seed to a berry. Originated by D. Bundy, Colerain, Ohio, from seed of Concord planted in 1879.

— Cortland. *R. Lambert & Sons.*

— Leavenworth. *Stayman.*

— Northern Light. *Bucke.*

— Osage. *Stayman.*

— Ozark. *Stayman.*

— Progress. *Stayman.*

— Wells. *Rabords.*

— White Beauty. *Stayman.*

— White Imperial. *Stayman.*

— Willis. *Rabords.*

— The following varieties were introduced from Persia by *Division of Pomology, U. S. Dept. Agriculture:*

Alhakhee, Askaree, Black Shahane, Chavooshee, Dizmar, Dooda, Hutab, Khallilee, Khishnigoor, Paykane, Razugee, Red Tabarza, Rish Baba (Galinburmaghee, or Shirazee), White Shahane, White Sifide, White Slismish.

Helianthus argophyllus, Texanus. *Thorburn.*

A native of Texas. The stock was procured from India and the seed grown in Florida. It is a marvel when in full bloom, and pre-

vious to flowering, its silvery foliage is very showy. It is at home in the south, where it attains a height of ten feet, branching from the ground to the top, and forming a perfect pyramid with nearly one thousand golden yellow flowers on the one plant, and continuing to bloom until frost.

Hibiscus, New Japanese. *Wilson.*

Hydrangea, Sapphire. *Lovett.*

The formation of trusses of this is different from most any cultivated hydrangea; they are formed by a few bracts surrounding a cluster of flower heads. The bracts are delicate porcelain white, and the flower heads are a deep azure blue, producing a very pretty effect. The foliage is very rich, and free from fungous attacks.

Hypericum Moserianum. *Temple & Beard.*

A hybrid with very large flowers of yellow, having a large center of reddish stamens. France.

Impatiens Sultani, variegated. Originated with *F. A. Scholes, Brooklyn.*

Kalmia angustifolia, aurea. *Temple & Beard.*

France.

— latifolia, crispa. *Temple & Beard.*

Foliage prettily crimped. England.

Laburnum, Park's Golden-leaved. *Kelsey.*

Leaves a solid bright yellow, permanent and very distinct; flowers in long, golden racemes of a different shade of yellow, similar to those of the common or "Golden Chain" variety. England.

Lantana, Nellie Bly. *Vick.*

Sweet scented; pure white, with lemon-yellow center. A strong grower and profuse bloomer.

Lathyrus splendens, or Pride of California. *Henderson.*

A striking climber of southern California, producing brilliant clusters of deep rose-red flowers.

Lettuce, Big Boston. *Henderson.*

Identical in color, shape and general appearance with the famous Boston Market Lettuce, but is double the size. It is about one week later in maturing.

— Blonde Block-Head. *Gregory.*

Sent out by Vilmorin. In structure and habit of growth it much resembles the Neapolitan cabbage lettuce, so well known by its fine heading qualities, but differs from it in its rich golden-yellow color.

— Carmine Gem. *Buckbee.*

— Early White Self-Folding Cos. *Ferry.*

A cos lettuce which does not need tying up. It forms a large, solid head like that of an Early York cabbage. The head is nicely self-blanching, yellowish-white in color, and very crisp, tender and of superior flavor.

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Lettuce, Longstander Bronze Head. *Johnson & Stokes.*

A long-standing sort with compact head and golden bronze color.

— Sunset. *Henderson.*

It forms large, solid heads, of a rich golden yellow, a shade of color hitherto unknown in this class of lettuce. It stands very long before going to seed, and is also an excellent keeper after being cut.

— Trianon Cos. *Henderson.*

Long, narrow leaves, which form solid heads, almost like a Wakefield cabbage, which bleach and quickly become snowy white. The cos lettuces excel all others in quality, having a taste and crispness unequalled. The leaves, when bleached, are stiff like celery stalks, and can be eaten in the same manner.

— Thorburn's Cold-frame White Cabbage. *Thorburn.*

Lilac, Alphonsus Laval. *Saul.*

Double; flowers large, violet-blue.

Lonicera Tartarica, variegata. *Temple & Beard.*

From Dr. Dieck, Germany.

Macadamia ternifolia. *Reasoner Bros.*

Queensland nut. Australia.

Mangoes, Black and Yam. *Reasoner Bros.*

Jamaica.

Mauritia flexuosa. *Reasoner Bros.*

Mariti Palm. South America.

Melothria punctata, or African Oak-leaved Climber. *Henderson.*

A rapid growing climbing annual from South Africa. The leaves are palmate (or palm-shaped) and of a bright refreshing green, and it grows so luxuriantly that it is difficult to penetrate it with the hand. Flowers are succeeded by great numbers of blue-brown berries.

Momordica involucrata, or New Red Balsam Apple. *Henderson.*

Climber from the mountains of Natal. The vines are strong, with vivid green, deeply cut foliage. The flowers are borne in profusion and are very large; some are creamy white, dotted with black, and others pure white with red pistils. The flowers are succeeded by beautiful sulphur-yellow fruits two inches long, which change to rich carmine scarlet; when ripe they burst and show the seeds of blood-red color. The fruits and flowers are borne on the vine at the same time.

Mulberry, Black Northern. *Stark Bros.*

Musk Melon, California Christmas Pine Apple. *Wilson.*

A winter melon; originated with Ira W. Adams, Napa Co., Cal.

— Giant of Colorado. *Johnson & Stokes.*

Fruits very large, with green flesh. Colorado.

Musk Melon, Ideal. *Buckbee.*

Myosotidium nobile, or Giant Forget-Me-Not. *Henderson.*

Perennial, growing about one and a-half feet high, producing during the spring months, and occasionally in the autumn, large dense clusters of forget-me-not bloom. The individual florets are one-half an inch across, brilliant blue, shading to white at the center. The leaves are large, nearly ten inches in diameter.

Myristica moschata. *Reasoner Bros.*

Nutmeg. East Indies.

Nerine flexuosa. *Reasoner Bros.*

Natal.

— *flexuosa*, var. *pudica*. *Reasoner Bros.*

Natal.

Oenothera, Ice King Primrose. *Lovett ; Hallock.*

The plant is of dwarf bushy growth ; the flowers of immense size, white, delicately shaded blush, and are produced in great profusion, blooming all summer. It is also said to be very hardy, coming from Montana.

Olive. *U. S. Dept. of Agr.*, as follows :

Ascolana, Correggiola, Du Guazzo, Gentile, Grassia, Infrantoi, Lec-cino, Marinella, Oriola, Piangente, Razza. St. Caterina.

Onion, White Multiplier. *Henderson ; Wilson.*

Oreodoxa sp. *Reasoner Bros.*

Demerara. British Guiana.

Pansy, New Peacock. *Wilson.*

A parti-colored English sort.

Papaver orientale and *bracteata* hybrids. *Henderson.*

These hybrid varieties include charming new colors, including exquisite blush pink, blotched purple, deep blood red, blotched black, glowing scarlet, pure reddish orange, soft salmon, etc.

Parsley, Beauty. *Buckbee.*

Passiflora, John Spalding. *Henderson.*

A variegated-leaved sport of Constance Elliott, originating with John Spalding.

Pea, Buckbee's Lightning Express. *Buckbee.*

Eighteen to twenty-five inches high. Good keeper.

— Chelsea. *Henderson.*

One foot in height, and is of compact short-jointed habit ; it is as early as American Wonder and earlier than Little Gem, and gives a much larger crop than either of these sorts, bearing in pairs from the bottom to the top an abundance of handsome pods, which are half as long again as these of any other first early dwarf kind.

— Early Prize. *Gregory.*

A cross between Tom Thumb and the Advancer, by Mr. Reed of

Vermont. Eighteen inches high, being slightly taller than Premium Gem, and, while equally early, it is decidedly a better cropper than either that or Tom Thumb. Pod large, heavy, and well filled. Also equal to the wrinkled varieties in sweetness and flavor. It can be planted earlier than these without danger of rotting.

Pea, Electric. *Tillinghast*.

— Favorite. *Gregory*.

A green wrinkled variety of branching habit. Grows two feet high, branching at the ground. Medium early. This is of the Abundance type, but the pods fill out better than that variety, and it is a better pea than either that or the Everbearing.

— Heroine. *Gregory*.

Ripens with the Champion, but the pods are longer and wider. A fine cropper. Three feet high. From Messrs. Sharpe, England.

— Iowa's Challenge. *Iowa Seed Co.*

An extra early variety. Vines eighteen inches.

— Marblehead Early Marrowfat. *Gregory*.

Pods large, often containing eight peas. Vines immensely strong; remains in bearing a long time. Comes in after the earliest.

— Nonpareil. *Tate & Son*.

— Pride of the Garden (Sugar). *Mills, Thorn Hill, N. Y.*

From four and one-half to five feet high, of very stout growth; the foliage is a healthy green and the vines are crowded with pods. Medium early.

— Queen. *Gregory*.

This pea has two very valuable characteristics, viz.: the extremely large size of the peas (much larger than Champion), and the remarkably dark, rich green color of the pods. Height two feet. Rather later than Champion. From Messrs. Sharpe, England.

— Shropshire Hero. *Gregory; Henderson*.

About as early as Advancer, and as good a bearer, while both the pods and peas are much larger. Vines three feet high. From England.

— White Prolific Marrow. *Gregory*.

This is not of the Marrowfat class, but a wrinkled pea as early as the Champion; vines two feet in height, bearing long, straight pods. From Messrs. Sharpe, England.

Pea, Sweet, Countess of Radnor. *Breck*.

Pale mauve standards, with a deeper shading of mauve; wings pale lilac.

— Primrose. *Breck*.

A near approach to a yellow sweet pea; quite distinct in color, the standards and wings pale primrose yellow; awarded first-class certificate by the Royal Horticultural Society. Eckford.

Peach, Alpha Cling. *Leonard Coates*.

- Peach, Austin Winter. *Leonard Coates.*
 — Captain Ede. *Hamilton.*
 — Champion. *Hamilton.*
 — Chase Early Free. *R. G. Chase & Co.*
 Very early, ripening with Alexander; of best quality. A chance seedling in the garden of S. W. Hopkins, Geneva, N. Y.
 — Future Great. *Stark Bros.*
 — Gen. Grant. *Leonard Coates.*
 — George's Late Cling. *C. M. Silva.*
 — Grover Cleveland. *Leonard Coates.*
 — Gulley. *A. G. Gulley, Mich.*
 — Hardy Tuscany. *Leonard Coates.*
 — Hollister's Free. *E. A. Riehl.*
 — Knight's Mammoth. *J. T. Whitaker.*
 — Late Golden. *H. A. Jones, Himrods, N. Y.*
 Originated near Seneca Lake, N. Y.
 — Lovett's White. *Lovett.*
 Valuable especially for hardiness of blossom and tree, rendering it a sure cropper. The fruit is large, pure white, of fine quality and ripens late.
 — Madison Mammoth. *Kennan.*
 — Missouri Blood Leaf. *Stark Bros.*
 — North American Apricot. *Stark Bros.*
 — Stark Heath. *Stark Bros.*
 — Strong's Mammoth. *Jackson.*
 — Superb Cling. *Stark Bros.*
 — Ulati. *Leonard Coates.*
 Pear, Anne Ogereau. *Leonard Coates.*
 — Coreless. *Bayles.*
 — Fitzwater. *H. A. Jones, Himrods, N. Y.*
 Fruit beautiful canary or golden-yellow, of medium size, slightly flushed on one cheek with a few freckles distributed evenly over the surface, mostly at the calyx; flesh juicy and melting to the core; flavor better than Bartlett. Small core and seeds. Ripens November to January. Originated near Seneca Lake, N. Y.
 — Groveland. *Lippincott, Ala.*
 — Old Kentucky. *Stark Bros.*
 — Santa Ana. *W. R. Strong Co.*
 — Victor. *S. Miller, Mo.*
 Pepper, Cardinal. *Henderson; Ferry.*
 A distinct variety, growing from five to six inches in length, being about two inches broad at the top and tapering to a point. Pepper slightly scimeter-shaped and is a glossy bright red color. Very sweet and thick fleshed.

Pepper, New Brazilian Sweet Upright Mammoth. *Thorburn.*
New bright red extra large sweet variety.

— Thorburn's New Fancy Wrinkled. *Thorburn.*

About the size of the Cherry pepper, but distinct in appearance.
This is one of the prettiest peppers ever introduced. It comes of two colors, red and yellow.

— Yellow Upright. *Landreth.*

Phlox, Childs' New Jubilee. (*P. Drummondii.*) *Childs.*

Physalis Peruviana. *Reasoner Bros.*

Peru.

Pinus Balfourii. *Kelsey.*

An exceedingly handsome pine of comparatively slow growth and very distinct peculiar cone-like foliage of very dark, rich color ; very hardy. Scotland.

Plantain, Chene Chumpa. *Reasoner Bros.*

India.

Platanus orientalis, Variegated Golden. *Kelsey.*

A new form of the eastern plane ; of moderately rapid growth and compact habit ; large, heavy, thick leaves, rich yellow or variegated dark green and yellow. England.

Plectocomia elongata. *Reasoner Bros.*

Java.

Plum, Bassford, *Leonard Coates.*

— Bunker Hill. *H. A. Jones, Himrods, N. Y.*

Originated near Seneca Lake. A seedling from the Sugar Plum. Size of Washington, quality of Bradshaw and season of Reine Claude.

— Burbank. *Burbank.*

The fruit is usually from five to five and a-half inches in circumference, and varying less in size than the other Japan plums ; nearly globular, clear cherry red, with a thin lilac bloom. The flesh is a deep yellow color, very sweet, with a peculiar and very agreeable flavor. The trees are unusually vigorous, with strong, upright shoots, and large, rather broad leaves. Commences to bear usually at two years of age.

— Engle's Gage. *Engle, Mich.*

— Golden Prune. *Leonard Coates.*

— Hill Top. *Stark Bros.*

— Illinois Ironclad. *Stark Bros.*

— Japan Freestone Gage. *Burbank (1890 ?).*

— Lincoln. *Lovett.*

The largest of all plums we know ; reddish purple in color, with amber flesh ; juicy, rich and delicious, ripens early ; tree a weak grower.

— Middlebury. *Willard.*

Plum, Missouri Apricot. *Stark Bros.*

— Okaw. *Nehring.*

— Poole's Pride. *Stark Bros.*

— Prairie Flower. *Stark Bros.*

— Tragedy Prune. *W. R. Strong Co.*

— World Beater. *Stark Bros.*

Poppy, Childs' Rosette. *Childs.*

Petals fimbriated, bright pink.

Potato, Brownell's Winner. *Burpee.*

— Corona Beauty. *Thorburn.*

This is an intermediate variety, originated on Long Island. The skin and flesh are white and the quality exceedingly fine. It is much of the shape of Rural No. 2, but entirely distinct in growth.

— Finch's Prolific Snowball. *Finch.*

Originated in the garden of Frank Finch, Clyde, New York. It is a cross between Finch's Early Perfection and the Snowflake, and is a late potato. It is very smooth and handsome in appearance; very solid and of fine flavor.

— Governor Rusk. *Salzer.*

Medium to large, roundish oblong to oblong.

— Mills' No. 10. *Mills, Thorn Hill, N. Y.*

White inside and outside, fine grained, late keeper. Originated with the introducer. Offered for trial in 1890.

— Red Giant. *Giddings.*

Red, oblong; eyes even with the surface.

— The People's. *Ford & Son; Maule.*

Originated in Minnesota; medium round or oblong, oval, skin creamy white, very much russeted; eyes few and even with the surface, giving it a handsome, smooth appearance; size large; a very strong grower.

— Vick's Perfection. *Vick.*

A chance seedling. The tubers grow compact in the hill, are large and uniform in size, oblong, inclining to oval, but generally flattened. Color white, with a tinge of pink around the eyes similar to the Hebron. The vine is of strong, vigorous growth, yet stocky and short jointed, maturing about the same time as White Star.

— Wilson's First Choice. *Wilson.*

Ptelea mollis. *Temple & Beard.*

From Dr. Dieck, Germany.

Pyrus communis, heterophylla. *Temple & Beard.*

Three forms; obtained from Dr. Dieck, Germany.

— Malus, Scheideckeri. *Temple & Beard.*

Handsome double flowering crab from Japan.

Pyrus, Malus, wild Red Rose Flowering. *Stark Bros.*

Quince, Fuller. *Lovett.*

Evidently belongs to the Orange group, but is larger than the Orange, ripening at the same period or a little earlier and is of exceedingly brilliant color. Quality is good; tree a strong grower and prolific.

Radish, All Seasons. *Iowa Seed Co.*

Handsome shape, stump-rooted, and ivory white in color. Equally good for spring, summer, fall or winter use. Exceedingly tender, crisp and delicious. China. Offered only as a premium in 1890.

— Eldorado. *Henderson.*

This novelty is identical with the old favorite Scarlet Turnip radish in shape, size and quality, but is a golden yellow color.

— Felton's Model White Box. *Johnson & Stokes.*

Differs from the Philadelphia White Box as follows: The shape is rounder and handsomer. It is earlier, with fewer and shorter leaves. Originated by Mr. Felton, Philadelphia, by selection.

— French Early Deep Scarlet Forcing. *Thorburn.*

— — Early Scarlet Forcing. *Thorburn.*

— — Early Scarlet White-Tipped Forcing. *Thorburn.*

— Huntington's New White Transparent. *Huntington.*

The finest pure white hot-bed radish; of exceedingly large size, rapid growth, tender and sweet. In size and shape it resembles very closely the Summer White. The tops are very short. It never cracks or rusts, and will attain a larger size, without running to seed, than any other sort.

— Mammoth Chinese. *Vaughan.*

— New Celestial. *Henderson.*

Imported from China. It is ready for use when two and a-half or three inches long and continues until nearly six inches long, making it almost an all seasons' radish. The flesh is firm and solid and pure white, and is very attractive in appearance.

— New Champion. *Faust.*

Three weeks after sowing, this radish is ready for the table. It is perfect in shape, bright scarlet color, very crisp and tender. The leaves are short and make a very small top.

— New Crystal Forcing. *Buckbee.*

— Non Plus Ultra. *Thorburn.*

Round, scarlet, short-leaved.

— Rapid Forcing. *Henderson.*

It resembles the Scarlet Turnip White-tipped variety, but is much earlier, coming to maturity in twenty-two days from the time of sowing, and having very small tops.

Radish, Short-Top Earliest White Turnip. *Landreth.*

A remarkably early sort, suitable for forcing ; very few and small leaves.

Raspberry, Acme. *Palmer, Ohio.*

— American Everbearing. *Thompson. M. Hatfield, Wayne Co., Indiana, originator.*

Black-cap.

— Cromwell. *Butler, Conn.*

— Doomore. *Sneably, Ohio.*

— Gladstone. *Green's Nursery Co.*

A large red berry, giving fruit from the middle of July until October. Originated with Charles Carpenter, Ohio.

— Idaho. *Palmer, Ohio.*

— Kansas. *Griesa, Kansas.*

— Lotta. *Brackets, Kansas.*

— Ransom's Everbearing. *Stark Bros.*

— Winona. *Smith.*

Rhus vernicifera. *Reasoner Bros.*

Varnish Tree. Japan.

Robinia Pseud-Acacia, mimosæfolia. *Temple & Beard.*

From France. Leaflets minute.

Rose, Clotilde Soupert. *Hill & Co.*

This plant is a vigorous grower, a free bloomer, very double and handsomely formed. It forms a bush from fifteen to eighteen inches high. The outer petals are pearl-white, shading to center of rosy pink, but varying sometimes from pearl-white to deep silvery rose. It makes a fine pot plant, on account of its free blooming habit and fragrance. Polyantha. (Soupert & Notting.) First appeared in this country in 1889.

— Count Henri Rignon. *Kelsey.*

Silver-flesh tint ; equal to American Beauty in size. (Hybrid Tea.)

— Ernest Metz. *Kelsey.*

Large silvery pink (Guillot et fils).

— Madame Pierre Guillot. *Kelsey.*

Large ; orange-yellow, lined with rosy crimson ; fine for bedding. (Guillot et fils.)

— Marquis of Salisbury. *Kelsey.*

Bright rose-crimson, shaded with silver.

— Oscar II, King of Sweden. *Kelsey.*

Large flower and foliage ; petals a peculiar shade, maroon-brown or brownish crimson.

— Princess Victoria. *Miller.*

This is said to be a sport from the old Malmaison ; its habit and

growth do not deny it, In growth it is as vigorous as its parent. It is very double, petals evenly arranged, and is almost a white rose, although when first expanding showing a sulphur tinge.

Rose, Souvenir de Wootton. *Strauss & Co.*

This rose is a cross between Bon Silene and Prince Camille de Rohan. It is a good grower, every shoot bearing a bud. Flowers very large and exquisitely fragrant. Color, rosy crimson with velvet shadings. (Hybrid Tea.) First appeared in 1889.

— White Perle. *Hill & Co., and others.*

A sport from Perle des Jardins. It is of strong, vigorous growth, producing freely very fine white flowers.

Salvia splendens, Clavanad and Ingenieur. *Schlegel & Fottler, and others.*

Scabiosa, Snowball. *Childs.*

Double white. German.

Sophora Japonica, pendula nova. *Temple & Beard.*

Broader in habit than the common form. Originated at Shady Hill Nurseries, Cambridge, Mass.

Spruce, Albert's New Glauous. *Kelsey.*

A form of our common hemlock, but more compact. It has the same graceful pendulous foliage, but in this new variety, from Scotland, the under side of the leaf is a silvery green color, contrasting effectively with the darker yet rich delicate green of the upper leaf.

— Black Hills. *M. E. Hinkley.*

Squash, Fordhook. *Burpee and others.*

It is extremely handsome; a bright yellow outside, and straw-yellow within. The flesh is dry and sweet, and the best in quality of winter squashes. Placed in a cool, dry room, keeps in perfect condition throughout the winter and spring, until late in June, when summer squashes are ready. The stem is thin and hard, and also the roots, consequently it is perfectly free from the attacks of the squash borer. Matures early. The meat is very thick and seed cavity small.

— Henderson's Golden Custard Bush. *Henderson.*

Exceeds in size any of the scalloped edged sorts, frequently attaining a diameter of two feet. The color is a dark rich golden yellow, and for quality cannot be excelled.

— Sweet Nut. *Wilson.*

Combined summer and winter squash, somewhat of the scallop type. Cream-color streaked with green. Originated with Paynter Frame, Delaware.

— Warren. *Gregory.*

Three years ago a vine appeared in a field of Essex Hybrid Squashes raised by a neighbor at Marblehead, Mass., bearing three squashes, which were distinct from the rest in that they had rough,

warty and thicker shells, and were of a richer color. The seeds from the three squashes have been planted by themselves, with the object of permanently fixing the new type. Not only is the shell generally harder and thicker than the Essex Hybrid, but the color is richer and deeper, and the quality decidedly better.

Stangeria paradoxa. *Reasoner Bros.*

South Africa.

Strawberry, Alabama. *J. Schnadlebach, Alabama.*

A strong grower, perfectly free from rust. Stands drought exceedingly well. Fruit large, similar to Haverland in size and shape; exceedingly productive. Color a beautiful crimson; blossom perfect. Ripens between Stevens and Michel's Early.

— Beder Wood, or Racster. *Brandt.*

Berries large bright glossy red, quite smooth and of even size and shape, of excellent quality, very early and enormously productive. The plant is a dark green, strong and perfectly healthy, with a perfect blossom.

"It was introduced last spring by Mr. Racster, after whom it was named by an Iowa Horticultural society, but since that time conclusive evidence has been presented to prove that the honor of originating it belongs to Mr. Beder Wood, of Moline, Ill., who sowed the seed that produced it in 1881, and saw the first fruit in 1883. Some years ago he let out twelve plants, under rigid restrictions, to an Iowa man, who subsequently reported that they had all died; but now he has just fruited half an acre, and has a large new plantation coming on, while a neighbor of his has disseminated thousands of plants of the same variety under the name of Racster. Mr. Wood, on his part, had given the berry his own name in full, and was having it tested by various parties with a view to its introduction, when he discovered the facts recorded above."—*Brandt.*

— Bessie. *J. Schnadlebach, Alabama.*

A seedling of the Crescent. The plant is very vigorous. Fruit is medium to large, of a beautiful glossy crimson, its glossiness being retained even when over ripe. It is very firm. Quality of the best.

— Boynton. *Price & Reed.*

Originated near Albany, N. Y. The Boynton is the best all round berry yet offered. It is a cross between the Crescent and Sharpless; berries are large, bright red, firm and solid; good for shipping. Known locally for two or three years.

— Chambers. *Kinney & Sons, originators. Brandt.*

— Dew. *Dew, Lansing, Mich.*

— Edgar Queen. *Brandt.*

A pistillate berry, one of 4,000 seedlings from seeds sown in 1883 by D. Brandt, Bremen, Ohio.

— Engle. *Engle, Mich.*

— Enhance. *Young.*

Strawberry, Gem. *Nehring.*— Hinman. *Ford & Son.*

This is a chance seedling that, from its vigorous growth and healthy foliage, attracted the attention of Mr. Hinman on his berry farm at Akron, Ohio. The plants are strong and vigorous, multiplying freely; foliage healthy; equalling the Crescent in productiveness, of much larger uniform size, holding its size to the last picking. They color all over at once, a beautiful bright crimson. The fruit is firm; the blossom is perfect. Fruit ripens medium early, with the Jessie.

— Jucunda Improved. *Lovett Co.*

A reproduction of the old Jucunda, or Knox's Seven Hundred, except that the fruit is larger and very uniform in size and shape, while the plant is a strong healthy grower, the old Jucunda being a weak grower.

— Lady Rusk. *Wm. Stahl, Ill.*

Vigorous grower and is firm as Wilson. Larger than Crescent, holding its size throughout the season. Several days earlier than Crescent. Pistillate.

— Lovett's Early. *Lovett Co.*

Originator's description: "Lovett's Early originated some five years since on poor old clay soil, that had not been cultivated for seven years. Parent supposed to be Crescent. Plant large, well-rooted, as vigorous and healthy as any known variety. Mats over the ground same as Crescent. Ripens among the very earliest. Will succeed better on poor soil than any other I know of, while on good soil and good cultivation there is as much improvement as any other strawberry. Yields as many berries in number as Crescent and fully as large as Sharpless, of first quality and a first rate shipper. Perfect blossom." Mr. Morris, Kentucky, originator.

— Middlefield. *Augur & Sons.*

"The plant is strong and healthy, and produces runners freely. The blossoms are pistillate; the season medium. The fruit is large and quite regular in form and size; berries are nearly conical. The fruit is quite firm, solid, and a good shipper; color, a dark glossy crimson, which gives it a brilliancy and attractiveness which few varieties possess. The flesh is crimson clear through. The berries color all over (no green tips); as the berries ripen they first turn to glossy scarlet and deepen in color to crimson as they approach maturity. In quality it is a favorite with our berry customers. It is productive and profitable."—*Augur*

— Neptune. *Young, Ohio.*— Oliver. *Strubler, Ill.*— Oregon Everbearing. *Wilson; Brandt.*— Saunders. *John Little, Granton, Ont.*

Healthy, vigorous, prolific, bright red, glossy.

— Shaw. *Little.*

Strawberry, Spuce's Perfection. *Stayman*.

— Stayman's No. 1. *Stayman*; *Cleveland Nur. Co.*
Late. Pistillate.

— Stayman's No. 2. *Stayman*.

— Stevens. *J. Schnadlebach, Ala.*

The plant is a healthy and vigorous grower. Berry size of Wilson and color of the Crescent. Fruit similar to Chas. Downing on the surface. Blossom imperfect.

— Tippecanoe. *Allen, Md.*

This is a selection from several hundred seedlings grown from seed produced in France. The plant is equally as hardy as any of our American strawberries, of very large size and wonderfully robust and strong, producing a large number of strong runners, which set plants rapidly. Quite productive for so large a variety, producing on the same ground fully double the yield of Sharpless or Cumberland, even late runners bearing large trusses of fruit. Fruit large and beautiful. It is of a most beautiful globe shape, with now and then a flattened berry. The flesh is highly colored. It ripens with the Cumberland and stands the drouth well. The flavor is rich and delicious, a characteristic of all French berries. Staminate.

— Townsend, Nos. 2, 3, 19, 20. *Townsend, Ohio.*

— Van Deman. *Bauer, Ark.*

— West Brook. *Brandt and others.*

— Williams. *David Greig, Cainesville, Ontario.*

Styrax Obassia. *H. H. Berger & Co.*

From Japan. Attains a height of 8 to 10 feet. Introduced also in 1889 by U. S. Nur. (Annals Hort. 1889, 105—the specific name misspelled.)

Syringa Japonica, argentea. *Temple & Beard.*

The first distinct sport yet obtained of this remarkable species. Foliage about half pure white; bark very black. Originated in a lot of several thousand seedlings at Shady Hill Nur., Cambridge, Mass.

Thrinax Barbadosensis. *Reasoner Bros.*

Barbadoes.

Tomato, Buckbee's Autumn King. *Buckbee.*

Smooth, scarlet.

— Early Ruby. *Henderson.*

A large, very early, solid sort found growing in a field of Perfection, near Monmouth, New Jersey.

— Green Mountain. *Giddings.*

— Ithaca. *Cornell Experiment Station.*

"Medium size, about 3 inches in diameter, nearly spherical, very smooth and remarkably uniform in size; color, light cherry. A new variety, very promising among table tomatoes; apparently valuable

for forcing, in which capacity we shall test it during the winter. The history of this variety is as follows :

"About twenty years ago, L. S. McWhorter, a retail grocer of Ithaca, who was attracted by a very fine specimen tomato shown by an old English gardener, purchased the fruit, and the succeeding year planted the seed in his private garden. The parent was the French *pomme d'amour*, or 'Love Apple.' Some years after one plant appeared, which was a marked improvement. From this, Fred McWhorter, his son, has made careful selections for several years, until he has secured a superior strain. It is strictly a local variety. We shall not dispose of seeds this season."—*Bull. 21, Oct., 1890, Cornell Exp. Sta.*

Tomato, Mansfield Tree. *Mills, Thorn Hill, N. Y.*

— Marquis. *Buckbee.*

An angular variety, originating in France in 1888.

— Mitchell No. 1. *Mitchell, St. Marys, Ont.*

— Red Cross. *Gregory and others.*

This tomato in form is of the Livingston class—round and handsome, but is earlier. It is even in size throughout the season, perfectly solid, a brilliant crimson in color, ripens close up to the stem, and bears harvesting better than most varieties.

— Ruby Queen. *Childs.*

Large, smooth and crimson-red.

— Table Queen. *Henderson.*

It grows in clusters of from four to six, and a large proportion of the individual fruits weigh from 12 to 16 ounces. As large as the Mikado, but perfectly smooth and round; solid, and contains fewer seeds than any other. A dark, rich shade of crimson. Offered only as a premium in 1890.

Tropæolum, Asa Gray. *Henderson; Gardiner.*

This new variety of *T. Lobbianum* is the lightest color yet produced, being a delicate primrose or soft sulphur yellow.

Turnip, Milk. *Salzer.*

— Moore's Golden Crown. *Delano Moore.*

Flesh very yellow and fine flavored. Noted for symmetry of form, immense size and keeping quality. Originated by Delano Moore, Presque Isle, Me.

Ulmus Americana, aurea. *Temple & Beard.*

Foliage all soft golden in color. Discovered in Vermont by F. L. Temple.

— campestris, pendula Smithi. *Temple & Beard.*

A dwarf, twiggy and yellow variety from England.

Walnut, Various Japanese. *Burbank.*

"Last winter [1888-9?] I obtained from Japan six other new kinds of walnuts. The foliage and growth of all are similar. The nuts are

of various strange forms : No. 1. (*J. Manschurica*). A large nut $1\frac{1}{2}$ inches long by $1\frac{1}{4}$ inches through ; shell corrugated like the butter-nut. No. 2. Smooth, same form as *Sieboldiana*, but only half as large ; a handsome little nut. No. 3. In form and general appearance about half way between *Sieboldiana* and the common English or Madeira nut. No. 4. A very large, long, smooth, hard-shelled nut. No. 5. A strange looking nut, flat and pointed like a chestnut. $1\frac{1}{4}$ inches long, 1 inch across, $\frac{1}{2}$ inch thick ; smooth, very thin shell and a delicious, sweet kernel, which always comes out complete in one piece with only a slight blow. No. 6. Larger than No. 5, otherwise similar, except a suture on each side so deep as to give the nut the appearance of being double ; very tender, rich, sweet kernel." Some or all of these have been introduced by *H. H. Berger & Co.*

Watermelon, Fordhook. *Burpee ; Wilson.*

Fruit nearly round, tough-skinned, medium green. Flesh bright red ; seeds white. Originated with Paynter Frame, Delaware.

-- Gragg. *Livingston.*

Very juicy, sweet and melting—in these respects equaling, if not excelling, the Ice Cream. Distinct in both outside and inside appearance. The latter is of a delicate salmon tint, which is exceedingly handsome and tempting. The outside color is dark green, with alternate stripes of a lighter green, the whole being covered with a delicate tracing of dark veins, giving the fruit a peculiar and handsome appearance. It occasionally shows a melon of a lighter shade, somewhat resembling the Gypsy. Originated in Northern Texas.

-- Hoosier King. *F. C. Huntington & Co.*

It originated with a prominent melon grower in Sullivan Co., Ind. The melons are of extra large size, oblong, and of even diameter through their whole length. Flesh exceedingly fine flavored and firm. Rind very thin, though very tough. A long keeper.

-- Johnson's Dixie. *Johnson & Stokes.*

Cross between Kolb Gem and Cuban Queen, and a week to ten days earlier than either ; the meat more scarlet and better flavored. Hard rinded and a good shipper. Originated by George Collins, North Carolina.

-- Rosy Cream. *A. W. Smith, Ga.*

White fleshed, with about six longitudinal rosy streaks. Firm and crisp.

-- Ruby-Gold. *A. W. Smith, Ga.*

Cross between Green-and-Gold and Jones. Flesh yellow and red, free from stringiness.

-- The Wild. *Henderson.*

This variety is believed to have originated with the Seminole Indians in the Everglades of Florida. It is a long melon like the Rattlesnake, resembling that variety in the markings on the rind, but far superior in quality. It also differs in shape from that sort, being much larger at the blossom end than at the stem end. In its native

- habitat it sometimes attains the weight of 75 or 80 pounds. "Wild" was the name it received from the Indians. It is a fine melon as to flavor, is crisp and ripens evenly within $\frac{1}{4}$ inch of the outer rind. The seed is very peculiar, and distinct from any other variety.

Watermelon, Vacluse Red-Flesh. *Thorburn.*

It is of French origin, very early, and of large size, with stem end slightly inclined to point. The flesh is a bright crimson, very sweet, not in the least stringy, and coming to within $\frac{1}{8}$ inch of the skin; the seeds are also red. The rind, though thin, is very tough and the shell glossy. It is of a dark green color, beautifully threaded with a still darker green.

— **Wisconsin Hybrid. *Salzer.***

Wineberry, Child's Japanese. *Childs.*

Rubus phanicolasius from Japan, from seeds sent to J. T. Lovett Co. by Professor C. C. Georgeson.

§ 2. PLANT PORTRAITS OF 1890.

A LIST OF ALL THE ILLUSTRATIONS IN LEADING HORTICULTURAL AND SOME AGRICULTURAL JOURNALS WHICH ARE OF SUCH CHARACTER AS TO AID IN THE DETERMINATION OF THE SPECIES.*

ABBREVIATIONS.—*Am. Agric.*, American Agriculturist; *Am. Flor.*, American Florist; *Am. Gar.*, American Garden; *Bot. Mag.*, Botanical Magazine; *Cal. Frt. Gr.*, California Fruit Grower; *Can. Hort.*, Canadian Horticulturist; *Gar. & For.*, Garden & Forest; *Gar. Chron.*, Gardeners' Chronicle; *Gar. Mag.*, Gardener's Magazine; *Gar. World*, Gardening World; *Gart.*, Gartenflora; *Hort. Belge*, Revue de l' Horticulture Belge et Etrangère; *Hort. Art Journ.*, Horticultural Art Journal; *Ill. Hort.*, L' Illustration Horticole; *Jard.*, Le Jardin; *Jour. Hort.*, Journal of Horticulture; *Jour. Roses*, Journal des Roses; *Orch & Gar.*, Orchard & Garden; *Pop. Gar.*, Popular Gardening; *Rev. Hort.*, Revue Horticole; *R. N.-Y.*, Rural New-Yorker; *Vick's Mag.*, Vick's Magazine.

C., colored plate.

(2), refers to the second volume, in such periodicals as run into two volumes in one year.

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| <i>Abies brachyphylla</i> , Bot. Mag. t. 7113, 7114. C. | <i>Abutilon vexillarium</i> , Garden, 274. C. |
| — <i>bracteata</i> , Gar. Chron. 673. | — <i>vitifolium</i> , Pop. Gar. 34. |
| — <i>concolor</i> , Gar. Chron. 748, 749. (2). | <i>Acacia armata</i> , Jour. Hort. 205. (2). |
| — <i>Fraseri</i> , Gar. Chron. 685. (2). | — <i>cordata</i> , Jour. Hort. 205. (2). |
| — <i>grandis</i> , Garden 291. (2). | — <i>Drummondii</i> , Jour. Hort. 205. (2). |
| — <i>Lowiana</i> , Gar. Chron. 750. (2). | — <i>ovata</i> , Jour. Hort. 237. |
| — <i>magnifica</i> , Garden 591. | — <i>pulchella</i> , Jour. Hort. 205. (2). |
| — <i>Nordmanniana</i> , <i>pendula</i> , Rev. Hort. 440. | — <i>Riceana</i> , Am. Flor. 67. (2). |
| — <i>violacea</i> , Gar. Chron. 751. (2). | — <i>verticillata</i> , Jour. Hort. 205. (2). |
| <i>Abutilon Golden Fleece</i> , Vick's Mag. 169. | <i>Acæna microphylla</i> , Garden, 177. |
| — <i>Thompsoni</i> , Gar. World, 133. (2). | <i>Achimenes</i> , Rosy Queen, Gar. World, 823. (2). |
| | <i>Acineta densa</i> , Bot. Mag. t. 7143. C. |

*The nomenclature in this list is that which accompanies the illustrations. The editor does not vouch in any manner for the accuracy of the illustrations indexed.

- Aconitum Fischeri*, Bot. Mag. t. 7130. C.
Acroclinium roseum, var. flore pleno, Rev. Hort. 487.
Actinopteris radiata, Gar. Chron. 107. (2).
Adiantum Bausei, Jour. Hort. 67. (2).
 — *capillus-veneris*, var. grande, Gar. Chron. 696. (2).
 — *dolabriforme*, Gar. World, 217. (2).
 — *gracillimum*, Orch. & Gar. 8.
Adonis vernalis, Pop. Gar. 85.
Ærides augustianum, Gar. Chron. 233.
 — *Houlleti*, Orchidophile, 17. C.
Æsculus Hippocastanum, Hort. Belge, 209.
 — *Parryi*, Gar. & For. 357.
Agapanthus umbellatus, Garden, 503. (2).
Agaricus campestris, Gar. World, 248. (2).
 — *deliquescens*, Gar. World, 249. (2).
 — *melleus*, Orch. & Gar. 12.
Agave Americana, Am. Gar. 759.
 — *Consideranti*, Rev. Hort. 391. 392.
 — *Palmeri*, Vick's Mag. 305.
Alkanet, the Italian, Gar. World, 645.
Allamanda violacea, Bot. Mag. t. 7122. C.
 — — Garden, 224. C.
Allium cyaneum, Gart. 113. C.
 — *Kansuense*, Gart. 113. C.
Almond, Commercial, Hort. Art. Jour. 17. C.
Alocasia Bachi, Ill. Hort. 77. C.
Aloe Bainesii, Gar. & For. 115.
Alsophila excelsa, Gar. Mag. 364.
Alum-Root, *Heuchera cylindrica*, Am. Agr. 138.
 — *Heuchera parvifolia*, Am. Agr. 138.
Amarantus caudatus, Gar. World, 709.
 — *tricolor*, Gar. World, 709.
- Amaryllis Conqueror*, Gar. World, 441.
 — *Johnsoni*, Vick's Mag. 265. C.
Amelanchier vulgaris, Gar. Chron. 621.
Ammobium alatum, Rev. Hort. 523.
Amphicome Emodi, Garden 458. (2).
Ananassa sativa, Gart. 273.
Anemone Japonica, Orch. & Gar. 219.
 — *Pennsylvania*, Pop. Gar. 177.
 — *Pulsatilla*, Rev. Hort. 545.
 — *Rose Japan*, Vick's Mag. 110.
 — *Rue*, Pop. Gar. 259.
 — *Virginiana*, Gar. Mag. 763. (2).
 — *White Japan*, Pop. Gar. 27.
 — — *Vick's Mag.* 109, 110.
Angræcum caudatum, Gar. Mag. 553. (2).
 — *fuscatum*, Garden 61.
 — *Kotschyi*, Garden 101.
 — *Sanderianum*, Jour. Hort. 489. (2).
Anguloa uniflora, Ill. Hort. 37. C.
Anona reticulata, Gart. 273.
Antennaria margaritacea, Rev. Hort. 521.
Anthericum albo-medio pictum, Jour. Hort. 155.
Anthurium Andreanum, Ill. Hort. 57. C.
 — *Scherzerianum*, Ill. Hort. 67. C.
 — — var. *maximum album*, Ill. Hort. 29. C.
Antirrhinum, a green flowered, Gar. Chron. 131. (2.)
Apple, Adam and Eve, Am. Gar. 273.
 — *Arkansas Beauty*, R. N.-Y. 875.
 — *Arkansas Seedling*, R. N.-Y. 875.
 — *Aromatic Russet*, Gar. Mag. 572. (2.)
 — *Benham*, Am. Gar. 273.
 — *Bloomless*, Am. Gar. 6.
 — *Bogdanoff*, R. N.-Y. 738.
 — *Bramley's Seedling*, Gar. Mag. 621. (2.)

- Apple, Candile-Sinoppe, Rev. Hort. 399.
 — Cellini, Gar. Mag. 619. (2.)
 — Cox's Orange, Gar. Mag. 622. (2.)
 — Diel's Fig, Am. Gar. 624.
 — Duchess of Oldenburg, Gar. Mag. 746. (2.)
 — Early Queening, Orch. & Gar. 25.
 — Early Ripe, Orch. & Gar. 25.
 — Galloway Pippin, Gar. Mag. 621. (2.)
 — Gano, Am. Gar. 272.
 — Gibson, Can. Hort. 43.
 — Golden Spire, Gar. Mag. 778. (2.)
 — Gravenstein, Gar. Mag. 117.
 — Grenadier, Gar. Mag. 620. (2.)
 — Hawthornden, Gar. Mag. 844. (2.)
 — Henderson's Seedling, Can. Hort. 332.
 — Hubbardston's Nonesuch, Can. Hort. 97. C.
 — Irish Peach, Gar. Mag. 653. (2.)
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 — Mrs. Barron, Gar. World, 89. (2.)
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 — *Lindeni*, Jour. Hort. 471. (2.)
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 — *Dalhousianum*, Garden 608. (2.)
 — *Devonianum*, Gar. Chron. 680.
 — *Leechianum*, Jour. Hort. 85.
 — *juno*, Jour. Hort. 85.
 — *Macfarlanei*, Jour. Hort. 177.
 — *nobile*, *Orchidophile* 304. C.
 — — *album*, *Orchidophile* 304. C.
 — — *Burford* var., Jour. Hort. 63.
 — — *Cooksonianum*, Jour. Hort. 63.
 — *Wardianum*, Jour. Hort. 8. (2.)
Dendrocalamus Sikkimensis, Gar. Chron. 793.
Desmodium penduliflorum, Pop. Gar. 233.
Deutzia candidissima, Am. Flor. 263.
 — — *flore-pleno*, Jour. Hort. 297.
 — *scabra*, Garden 315.
Dianthus alpinus, Garden 269. (2.)
 — *Caryophyllus*, Ill. Hort. 9. C.
 — *neglectus*, Garden 8. C.
Dictamnus Fraxinella, Am. Flor. 328.
Diervilla Middendorffiana, Gar. Chron. 581.
Dimorphotheca graminifolia, Garden 180. (2.) C.
Diospyros Virginiana, Am. Gar. 651.
Dipladenia Brearleyana, Garden 185.

- Disa grandiflora*, Garden 516.
 — *tripetaloides*, Gar. Chron. 768.
Dogwood, Weeping, *Cornus florida pendula*, Vick's Mag. 333.
Doronicum plantagineum var *excelsum*, Gart. 653; Garden 437. (2.)
Drosera cistiflora, Bot. Mag. t. 7100. C.
Durio Zibethinus, Gart. 273.
Echinocactus cylindraceus, Gar. Chron. 167. (2.)
 — *Emoryi*, Am. Gar. 459; Vick's Mag. 303.
 — *hexædrophorus*, Am. Gar. 461.
 — *pectinatus robustus*, Gart. 513. C.
 — *Simpsoni*, Gar. Chron. 166. (2.)
 — *Visnaga*, Am. Gar. 461.
Echinops Ritro, Rev. Hort. 524.
Egg-Plant, Large Round Violet. Am. Gar. 219.
 — Long Violet, Am. Gar. 220.
 — Round White, Am. Gar. 221.
 — Scarlet Fruited, Gar. Mag. 817. (2.)
 — White Chinese, Am. Gar. 220.
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Eichhornia azurea, Rev. Hort. 540. C.
 — (*Pontederia*) *crassipes*, Am. Flor. 511.
Elæagnus longipes, Pop. Gar. 15.
Embothium coccineum, Gar. Chron. 717.
Epacris ardentissima, Am. Flor. 543.
 — *hyacinthiflora candidissima*, Am. Flor. 543.
 — — *fulgens*, Am. Flor. 543.
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Ephedra altissima, Gar. Chron. 792.
Epiphronitis Russelianum var. *Gærtneri*, Gart. 581.
 — *truncatum*, Am. Flor. 135: Am. Gar. 535; Gar. Chron. 173.
 — — on *Pereskia* stock, Vick's Mag 152.
Epiphronitis Russelianum var. *roseum*, Am. Flor. 327.
 — *Veitchii*, Jour. Hort. 518. (2.)
Episcia maculata, Bot. Mag. t. 7131. C.
Equisetum sylvaticum, Gar. Mag. 524. (2.)
Eremurus aurantiacus, Bot. Mag. t. 7113. C.
 — *Bucharicus*, Gart. 57. C.
Erianthus Ravennæ, Rev. Hort. 546.
Erica andromedæflora, Gart. 25.
Eriogonum androsaceum, Gar. Chron. 260.
 — *compositum*, Gar. Chron. 261.
 — *corymbosum*, Gar. Chron. 525. (2.)
 — *ovalifolium*, Gar. Chron. 260.
 — *racemosum*, Gar. Chron. 528. (2.)
 — *Thomasii*, Gar. Chron. 529. (2.)
Eryngium Olivierianum, Garden 97.
Erythrolæna conspicua, Gart. 563.
Eucalyptus Andreana, Rev. Hort. 346.
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Eucharis Amazonica, Am. Flor. 363; Gar. Chron. 193.
 — *Bakeriana*, Bot. Mag t. 7144. C.; Gar. Chron. 417.
Eugenia myrtifolia, Am. Gar. 756.
Eupatorium probum, Gar. Chron. 321.
Euphorbia heterophylla, Gart. 105.
 — *meloformis*, Am. Gar. 463.
Exochorda grandiflora, Am. Flor. 565; Gar. Chron. 613; Orch. & Gar. 92.
Fern, *Chatti*, Gar. Chron. 461.
 — Maiden Hair, seedling of, Pop. Gar. 178.
 — Royal, Gar. World 181. (2.)
 — Stag Horn, Am. Gar. 145.
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 — New Zealand filmy, Garden 173.
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 Fritillaria (Korolkowia) Sewerzowi, Jour. Hort. 257.
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 — General Roberts, Gar. Mag. 525. (2.)
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 — miniatum, Garden 298. (2.) C.
 Gladioli, Lemoine's Hybrid, Cal. Frt. Gr. 281; Garden 327. (2.)
 Gladiolus Colvillei, The Bride, Garden 489. (2.)
 — hybridus, Ill. Hort. 107. C.
 — Snow White, Am. Flor. 279.
 — sulphureus, Garden 58, 66. (2.) C.
 — Turicensis, Gar. & For. 89.
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 — — Iglesias, Hort. Belge 217. C.
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 — — Charles de Bosschere, Jour. Hort. Belge 217. C.
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 Grape, Black Hamburgh, Gar. Mag. 586, 587. (2.)
 — — Prince, Gar. Mag. 587. (2.)
 — Calabrian Raisin, Gar. Mag. 588. (2.)
 — Canada Rupestris, Prog. Agr. et Vit. 58. C.
 — Colerain, Hort. Art Jour. 79.
 — Esperione or Espiran, Gar. Mag. 586. (2.)
 — Gros Colman, Gar. Mag. 586. (2.)
 — — Guillaume or Barbarossa, Gar. Mag. 587. (2.)
 — — Maroc, Gar. Mag. 587. (2.)
 — Horsford's Mammoth, R. N.-Y. 737.
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 — Lady Downes, Gar. Mag. 588. (2.)
 — Madresfield, Gar. Mag. 588. (2.)
 — Mrs. Prince or Prince's Muscat, Gar. Mag. 589. (2.)
 — Muscat of Alexandria, Garden, 306 (2); Gar. Mag. 589. (2.)
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- Grape, *Rupestris* Petit-bouschet, Prog. Agr. et Vit. 172. C.
 — West's St. Peter's, Gar. Mag. 589. (2.)
 — White Muscat, Cal. Frt. Gr. 23.
Gunnera scabra, Gar. Chron. 665. (2); Gar. Mag. 845. (2.)
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Gymnotrix latifolia, Rev. Hort. 546.
Gynierum argenteum, Rev. Hort. 489.
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Habenaria militaris, Jour. Hort. 223. (2.)
Hæmanthus Lindenii, Gar. Chron. 437 (2); Ill. Hort. 89. C.
Hakea laurina, Bot. Mag. t. 7127. C.
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Helichrysum bracteatum, double-flowered, Rev. Hort. 372. C.
 — — *grandiflorum*, Rev. Hort. 486.
Helleborus maxima, Am. Gar. 63.
 — *niger altifolius*, Gar. World 281.
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Houlletia odoratissima var. *Antioquiensis*, Hort. Belge 121. C.
Howea (*Kentia*) *Belmoreana*, Gar. Chron. 75. (2.)
 — *Forsteriana*, Gar. Chron. 75, 533; Garden 197. (2.)
Hoya imperialis, Gar. Mag. 211.
 Hyacinths, Single and Double, Vick's Mag. 300.
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 — *Hortensia*, Pop. Gar. 58; Vick's Mag. 68.
 — *Otaksa*, Am. Gar. 415; Can. Hort. 1. C; Orch. & Gar. 110.
 — *paniculata*, Can. Hort. 2; Garden 455.
 — — *grandiflora*, Garden 569. (2); Vick's Mag. 67.
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 — *ramulus coccinea*, Am. Flor. 361; Orch. & Gar. 109.
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 — *vestita*, var. *pubescens*, Gar. & For. 17.
Hymenocallis Caribbæa, Gar. World 421.
 — *rotata*, Am. Gar. 209.
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 — *Kalmianum*, Gar. & For. 113.
 — *Moserianum*, Hort. Belge 97. C.
 — *Hypericum prolificum*, Gar. & For. 526.
Hypoxis erecta, Am. Gar. 420.
Idesia polycarpa, Gart. 64.
Ilex longipes, Gar. & For. 345.
Inula glandulosa, Gar. Mag. 541. (2.)
Ipomœa hederacea, Jardin 128.
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- Iris Bakeriana, Garden 642. C;
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 — (Xiphion) Boissieri, Bot. Mag.
 t. 7097. C.
 — Bornmulleri, Garden 462. C;
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 — Danfordiæ, Bot. Mag. t. 7140.
 C; Gart. 401. C.
 — Gatesii, Gar. Chron. 17. (2.)
 — Germanica, Hort. Belge 145.
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 — Monspur, Garden 462. C.
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 — pavonia, Garden 530. (2.) C.
 — — cœrulea, Garden 530. (2.)
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 — Persica, Gar. Chron. 577.
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 C; Gar. Chron. 365; Jour.
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 813. (2.)
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 500. (2.)
 — — Veitchiana, Gar. World
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 7106. C.
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 (2.)
 — Bolanderi, Garden 396. C. (2.)
 — Browni, Garden 173. (2.)
 — Canadense, Gar. Mag. 556. (2.)
 — candidum, Gar. Chron. 50. (2.)
 — cordifolium, Gar. Chron. 41.
 (2.)
 — giganteum, Gar. Chron. 46. (2.)
 — Henryi, Gar. Chron. 380. (2.)

- Lilium longiflorum*, Gar. Mag. 779.
 (2.)
 — — *Harrisii*, Gar. World 233. (2.)
 — *maritimum*, Gar. 396. C. (2.)
 — *Nepalense* var. *ochroleucum*, Gar. 368.
 — *pardalinum luteum*, Gar. 396 C. (2.)
 — *pomponium*, Gar. Chron. 51 (2.)
 — *rubrum*, Gar. Mag. 557.
 — *superbum*, Gar. 506 C. (2.)
 — *Thunbergianum* var. *Alice Wilson*, Gar. 440. C. (2.)
 — *Van Houttei*, Gar. 440. C. (2.)
Lily, Chinese Sacred, Gar. Mag. 302.
 — *Double Tiger*, Pop. Gar. 82.
 — *Martagon* or *Turk's Cap*, Pop. Gar. 48.
 — *White Martagon*, Gar. 393. (2.)
Linum arboreum, Jour. Hort. 193.
Liquidambar styraciflua, Gar. 208. (2.)
Lithospermum canescens, Am. Gar. 598.
Loasa lateritia, Hort. Belge 193. C.
Lobelia gracilis, Garden 354. (2.)
Locust, *Robinia Pseudacacia*, Gar. & For. 311.
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 — *splendida*, Gart. 65.
 — *Sullivantii*, Gar. & For. 191.
Lotus peltorhynchus, Gart. 601. C.
Luculia gratissima, Rev. Hort. 180. C.
Lueddemannia Pescatorei, Bot. Mag. t. 7123. C.
Lunaria annuelle, Jardin 112.
 — *biennis*, Rev. Hort. 487.
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Lupine, changeant de *Guikshankshybride*, Rev. Hort. 252. C.
 — *hybride atrococcine*, Rev. Hort. 252. C.
 — *jaune scafre*, Rev. Hort. 252. C.
 — *nain*, Rev. Hort. 252. C.
 — *subcarnosus*, Rev. Hort. 252. C.
Lycaste Schilleriana, Gart. 233. C.
 — *Skinneri*, Garden 397; Gar. Chron. 424; Vick's Mag. 233. C.
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 — *Phlegmaria* var. *parvifolium*, Gart. 100, 101.
Lycoris squamigera, Gar. & For. 177.
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Maclura aurantiaca, Gar. Mag. 808, 809.
Madrona, *Arbutus Menziesii*, Gar. & For. 515.
Magnolia parviflora, Jour. Hort. 3. (2.)
 — *stellata*, Am. Flor. 305; Gar. Chron. 617.
Malpighia ilicifolia, Ill. Hort. 47. C.
Malva moschata alba, Pop. Gar. 108.
Mamillaria (Anhalonium) fissurata, Am. Gar. 465.
 — *micromeris*, Am. Gar. 460.
Manettia cordifolia, Am. Agr. 263.
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 — *fragrans*, Jardin 259.
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Masdevallia Carderi, Bot. Mag. t. 7125. C.
 — *fulvenscens*, Gar. Chron. 325. (2.)
 — *Harryana*, Orchidophile 80. C.
 — *Lowii*, Gar. Chron. 268. (2.)
 — *Schröderiana*, Jour. Hort. 557. (2.)
 — *Shuttleworthii*, Gart. 457. C.
Massangea hieroglyphica, Garden 244.
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- Melon d'Antibes blanc d'hiver, Rev. Hort. 176.
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 — Etoile de feu, Rev. Hort. 36. C.
 — Gerbe d'or, Rev. Hort. 36. C.
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 Nanodes Medusæ, Jour. Hort. 51. (2.)
 Narcissus bicolor, Am. Agr. 561.
 — bicolor Madame de Graaff, Gar. World 553.
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 — Emperor \times N. triandrus, Garden 153. (2.)
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 — triandrus albus, Jour. Hort. 319.
 — — calathinus, Gar. World. 393.
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 Nemophila Menziesii discoidalis, Gar. World 773.
 Nepenthes O'Brieniana, Ill. Hort. 109. C.

- Nepenthes* O'Brieniana Burkei, Gar. World 137. (2.)
 — — Burkei excellens, Jour. Hort. 161. (2.)
 — — Curtisi, Bot. Mag. t. 7138. C. Gar. World 477.
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Nigella, de Damas, Rev. Hort. 545.
 — Damascena, Garden 130.
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 — sativa, Am. Gar. 570.
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Nymphæa odorata sulfurea, Rev. Hort. 540. C.
 — Zanzibariensis, Hort. Belge 108. C.
Nyssa aquatica, Gar. & For. 491.
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 — *Quercus lobata*, Gar. & For. 611.
 — — macrocarpa, Gar. & For. 407.
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Odontoglossum Andersonianum, Gart. 377. C.
 — Bleui splendens, Jour. Hort. 461.
 — cristatum Lindi, var. Lehmanni Gart. 57. C.
 — Pescatorei var. Am. Flor. 333.
 — Harryanum, Orchidophile 208. C.
 — Horsmanii, Gar. World 573.
 — Humeanum, Gar. Mag. 271.
 — Inseayi, Gart. 474.
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 — Noëvium, Pop. Gar. 62. (6.)
 — Pescatorei, Gar. Chron. 200.
 — ramosissimum, Jour. Hort. 503.
Odontoglossum Rossii var. majus, Hort. Belge 106.
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 — Wattianum, Garden 416. C.
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 — Haasti, Gar. 149. (2.)
Olive, Japan Wild, Pop. Gar. 15. (6.)
 — Mission. Cal. Frt. Gr. 388.
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 — Osage, Gar. Mag. 808, 809.
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 — *crenata*, Gar. 509.
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Pachira insignis, Jour. Hort. 595. (2.)
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Pachystoma Thomsonianum, Gar. Mag. 441.
Pæonia, single flowered, Gar. Chron. 737.
 — *corallina*, Gar. Chron. 740.
 — *Wittmanniana*, Gar. 201. (2.)
 — *Single White Moutan*, Gar. 370. (2.) C.
 — *Tree*, Gar. 481.
Palm, Cocanut, Vick's Mag. 591.
Pancratium amœnum, Trade Jour. 27; Am. Gar. 419; Gar. 303.
 — *fragrans*, Gar. Chron. 359. (2.)
 — *illyricum*, Gar. 228. (2.) C.
 — *rotatum*, Am. Flor. 257.
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 — *plicatum*, Garden 245.
 — *virgatum*, Gar. 245; Rev. Hort. 525.
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 — *Hartree*, Gar. 552. (2.) C.
Papaver croceum, Rev. Hort. 60. C.
 — *nudicaule*, Orch. & Gar. 128; Vick's Mag. 297. C.
 — *rupifragum*, var. *Atlanticum*, Bot. Mag. t. 7107. C.
Passiflora cœrulea, Jardin 50.
 — *Constance Elliott*, Gar. 37. (2); Vick's Mag. 343.
 — *Miersii*, Bot. Mag. 7115. C.
 — *quadrangularis*, Gar. 584.
 — *princeps*, Gar. 584.
 — *vitifolia*, Gar. Chron. 213. (2.)
Passion Flower, Passiflora racemosa, Gar. Mag. 335.
Pea, Rostroy, Can. Hort. 16.
 — *Stratagem*, Pop. Gar. 251.
 — *Sweet*, Gar. 330.
Peach, Champion, Orch. & Gar. 191.
 — *Dwarf Japan Blood*, Trade Jour. 69.
 — *Early Imperial*, Cal. Frt. Gr. 309.
 — *Tree, Model*, Am. Gar. 129.
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 — *Beurre Bachelier*, Gar. 366. (2.)
 — *Beurre Bosc*, Gar. Mag. 794. (2.)
 — — *Clairgeau*, Gar. 367. (2.)
 — — *Clairgeau*, Gar. Mag. 624. (2.)
 — — *d'Amanlis*, Gar. Mag. 4.
 — — *de l'Assomption*, Gar. Mag. 18.
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 — — *de Rance*, Gar. Mag. 71.
 — — *Diel*, Garden. 241.
 — *Colmar d'Été*, Gar. Mag. 616.
 — *Doyenne Boussock*, Gar. 367. (2.)
 — *Easter Beurre*, Gar. Mag. 622. (2.)
 — *Fondante d'Automne*, Gar. Mag. 762. (2.)
 — *Gerber*, Hort. Art. Jour. 21. C.
 — *Glout Morceau*, Gar. Mag. 624. (2.)
 — *Jersey Gratioli*, Gar. Mag. 88.
 — *Josephine de Malines*, Gar. Mag. 623. (2.)
 — *Krull Winter*, Pop. Gar. 167.
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 — *Marie Louise*, Gar. 367. (2); Gar. Mag. 625. (2.)
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- Pear, Sapieganka, Can. Hort. 238.
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 — — Early, Pop. Gar. 46.
 — William's Bon Chretien, Gar. Mag. 625. (2.)
 — Worden, Am. Gar. 753.
- Pecan, *Carya olivæformis*, Hort. Art. Jour. 85. C.
- Pedicularis megalantha, Bot. Mag. t. 7132. C.
- Pelargonium Countess of Derby, Vick's Mag. 201. C.
 — a grandes fleurs, Rev. Hort. 87.
 — Jealousy, Garden 400.
 — zonal, Rev. Hort. 86.
- Pelecyphora aselliformis var. concolor, Am. Gar. 474.
- Peliosanthes albida, Bot. Mag. t. 7110. C.
- Pellæa atropurpurea, Am. Agr. 74.
 — gracilis, Am. Gar. 660.
- Pennisetum longistylum, Rev. Hort. 489.
- Pentstemon gentianoides, Gar. 603.
 — Menziesii var. Scouleri, Gar. Chron. 204.
- Pepper, Bull's Nose, Gar. Mag. 134.
 — Cardinal, Rev. Hort. 10.
 — Cayenne, Gar. Mag. 207.
 — Celestial, Gar. Mag. 47.
 — Chinois, Rev. Hort. 10.
 — Pimento (*C. annuum*), Gar. Chron. 335. (2.)
 — Procopp's Giant, Pop. Gar. 29.
- Pereskia aculeata, Bot. Mag. t. 7147. C.
 — Bleo, Am. Gar. 462.
- Pescatōrea Klabochorum, Gart. 321. C.
- Petunia fimbriata venosa, Gart. 614.
 — Webb's Star, Gar. Mag. 119.
 — Yellow throated, Gar. Mag. 85.
- Phaius Cooksoni X, Gar. Chron. 389.
 — Humblotii, Gar. World 729;
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 — hybridus Cooksoni, Jour. Hort. 444.
- Phalænopsis amabilis, Am. Flor. 89. (2); Gar. 157. (2);
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- Phalænopsis, F. L. Ames, Gar. & For. 29.
 — Harriettæ, Gar. 156. (2.) C.
 — Schilleriana, Hort. Belge 30.
- Phlebodium aureum, Gar. 351. (2.)
- Philadelphus grandiflorus, Gar. 413. (2.)
 — microphyllus, Gart. 40; Pop. Gar. 109.
- Phlox, Queen of White, Gar. 459.
 — white herbaceous, Gar. 105. (2.)
- Phoenix Roebelenii, Gar. & For. 273.
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- Phormium tenax, Vick's Mag. 340.
- Phyllocactus Ackermanni, Am. Gar. 446.
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- Picea Breweriana, Gar. & For. 66, 67.
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- Picotee, heavy-edged, Gar. World 745.
 — Yellow-ground, Gar. World 745.
- Pierardia dulcis, Gart. 273.
- Pilocereus Columna Trajani, Rev. Hort. 129.
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- Pine Tree, Japanese, Gar. Chron. 12.
- Pinguicula caudata, Blumen lila, Gart. 96.
- Pink, Boiard, Gar. World 357.
 — Clove, Pop. Gar. 111.
 — Dianthus alpinus, Garden 269. (2)
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- Pink, neue niedrige Remontant, Gart. 201. C.
- Pinus densiflora*, Vick's Mag. 3.
- — *albiflora*, Vick's Mag. 4.
- *Montezumæ*, Gar. Chron. 465, 466, 467, 475. (2.)
- *parviflora*, Vick's Mag. 5.
- *ponderosa*, Gar. Chron. 557,* 561. 569.
- Piptanthus Nepalensis*, Jour. Hort. 399. (2.)
- Pitcairnia Darblayana*, Rev. Hort. 33.
- Platycerium grande*, Gar. Chron. 97. (2.)
- Platycodon grandiflorum*, Gar. World 713.
- Pleurothallis ornata*, Bot. Mag. t. 7094. C.
- *platyrachis*, Bot. Mag. t. 7129. C.
- Plum*, Angelina Burdett, Garden 337.
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- des Bejonnières, Rev. Hort. 228. C.
- Early Red, Am. Gar. 625.
- Golden Beauty, Hort. Art. Jour. 45. C.
- Grand Duke, Hort. Art. Jour. 72. C.
- Green Gage, Garden 409.
- Hattankio, Am. Agr. 16.
- Kelsey, Am. Agr. 16; Rev. Hort. 543.
- Lincoln, Orch. & Gar. 67.
- Masu, Am. Agr. 16.
- Moldavka, Am. Gar. 625.
- Ogon, Am. Agr. 16.
- Prince of Wales, Hort. Art. Jour. 69. C.
- *Prunus Simoni*, Am. Agr. 16.
- Purple-leaved, Pop. Gar. 51.
- *Satsuma*, Am. Agr. 16; R. N.-Y. 230.
- Ura-Beni, Am. Agr. 16.
- Voronesh Yellow, Am. Gar. 625.
- Podophyllum pleianthum*, Bot. Mag. t. 7098. C.
- Poison Ivy, Vick's Mag. 317.
- Polyanthus*, laced, George IV, Gar. Mag. 240.
- Polygala paucifolia*, Am. Gar. 597.
- Polygonum lanigerum*, Gart. 224.
- Polypodium vulgare*, Am. Gar. 660.
- — var. *trichomanoides*, Garden 53; Gar. Mag. 412.
- Pomelo, Aurantium, Am. Gar. 717.
- Poppies, Shirley, Vick's Mag. 1. C.
- Poppy, *Papaver nudicaule*, Orch. & Gar. 128; Vick's Mag. 297. C.
- Populus nigra*, Hort. Belge 256.
- Potato, Alaska, R. N.-Y. 151.
- Early Six Weeks Market, Orch. & Gar. 80.
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- Pomme de terre Junon, Rev. Hort. 161.
- Potentilla hybrida flore pleno*, Rev. Hort. 305.
- Prepusa Hookeriana*, Gar. Chron. 421.
- Prestœa Carderi*, Bot. Mag. t. 7108. C.
- Primrose, Double Chinese. Pop. Gar. 83.
- evening, Ice King, Orch. & Gar. 173.
- Primula Allioni*, Gar. Mag. 409.
- *Chinensis cristata hybrida*, Gart. 616.
- *cortusoides Sieboldi*, Gar. World 535.
- double Chinese, Garden 127.
- obconica, Can. Hort. 54.
- the wild Chinese, Gar. Chron. 564. (2.)
- Primulina Sinensis*, Bot. Mag. t. 7117. C.
- Protea nana*, Bot. Mag. t. 7095. C.
- Prunopsis Mume*, Rev. Hort. 209.
- Prunus Allegheniensis*, Gar. & For. 429.
- *japonica spæhrica*, Rev. Hort. 468. C.

- Pruus* Pissardi, Jour. Hort. 283.
 — *Pseudo-Cerasus*, Gar. Chron. 609.
 — *Siberica*, Am. Gar. 646.
 — *Simoni*, Am. Agr. 16.
 — *Sinensis*, Garden 605. (2.)
Psidium Passeanum, Rev. Hort. 233.
Psilotum flaccidum, Gart. 97, 101.
 — *triquetrum*, Gart. 101.
Ptelea aptera, Gar. & For. 333.
Puya Chilensis, Gar. Chron. 685.
Pyrethrum, Single, Vick's Mag. 329.
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 — *uliginosum*, Pop. Gar. 30. (6.)
Pyrus arbutifolia, Gar. & For. 417.
 — *coronaria*, Am. Gar. 650.
 — *heterophylla*, Gar. Chron. 115.
 — *spectabile*, Am. Flor. 565.
Quercus lobata, Gar. & For. 611.
 — *macrocarpa*, Gar. & For. 407.
Quince, Champion, Hort. Art Jour. 81. C.
 — *Common Scarlet Japan*, Am. Agr. 137.
 — *Fuller*, Orch. & Gar. 157.
 — *grandiflora*, Am. Agr. 137.
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Ranunculus Asiaticus superbissimus, Hort. Belge 133. C.
Raphiolepis ovata, Jour. Hort. 277. (2.)
Raspberry, Gladstone, Am. Gar. 564.
Raspberry, Kansas, Am. Farm Hort. 13.
 — *Lovett*, Orch. & Gar. 209.
 — *Muskingum*, Am. Farm Hort. 10.
 — *Progress*, Am. Farm Hort. 1 ; Can. Hort. 82 ; Orch. & Gar. 3.
 — *Thompson's Early Prolific*, Orch. & Gar. 125.
 — *Winona*, Am. Farm Hort. 15.
Ravenala Madagascariensis, Rev. Hort. 152.
Rehmannia glutinosa, Gar. Chron. 156. (2.)
Reinwardtia tetragyna, Bot. Mag. t. 7136. C.
Renanthera Lowii, Hort. Belge 60. C.
Rhipidopteris peltata, Gart. 101.
Rhipsalis funalis, Am. Gar. 465.
 — *Houlletii*, Gart. 119.
 — *Regnellii* G. A. Lindberg n. sp., Gart. 119.
 — *salicornioides*, Am. Gar. 463.
Rhodanthe Manglesii, Rev. Hort. 523.
Rhodochiton volubilis, Hort. Belge 252. C.
Rhododendron Boothii, Bot. Mag. t. 7149. C.
 — *Countess of Haddington*, Gar. World 505.
 — *Manglesi*, Garden 225. (2.)
 — *maximum*, Am. Gar. 595.
 — *Nilgaricum*, Gar. Mag. 381.
 — *praecox rubrum*, Garden 32. (2.) C.
Rhodostachys andina, Bot. Mag. t. 7148. C.
 — *Pitcairniæfolia* var. *Kirchhoffiana*, Gart. 345. C.
Rhodotypus kerrioides, Orch. & Gar. 92.
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- Rodgersia podophylla, Garden 125. (2); Gar. Mag. 477.
- Romneya Coulteri, Am. Flor. 397.
- Rosa berberifolia, Bot. Mag. t. 7096. C.
- foliolosa, Gar. & For. 101.
 - multiflora, Bot. Mag. t. 7119. C.; Gar. & For. 405.
 - rugosa, Orch. & Gar. 91; Rev. Hort. 17.
 - — fimbriata, Rev. Hort. 427.
 - Sayi, Am. Gar. 317.
 - Watsoniana, Gar. & For. 477.
- Roscoea purpurea, Gar. Chron. 191. (2.)
- Rose Aimee Vibert, Garden 401. (2.)
- alba var. suaveolens, Gar. Chron. 44.
 - Alphonse Soupert, Jour. Roses 88. C.
 - Autumn, group of, Garden 73.
 - Baroness Rothschild, Vick's Mag. 65. C.
 - Bennett, W. F., Am. Flor. 431.
 - Bouquet d'Or, Garden 180. C.
 - Bride, Am. Flor. 431.
 - Camoens, Jardin 206.
 - Capucine jaune bicolore, Jour. Roses 24. C.
 - Capucine ou bicolor, Jour. Roses 23. C.
 - Clotilde Soupert, Hort. Art. Jour. 25. C.
 - Comtesse Julie Hunyadi, Jour. Roses 56. C.
 - Copper Austrian, Garden 600. (2.) C.
 - Docteur Grill, Garden 56. C.
 - Edmond Sablayrolles, Trade Jour. 2.
 - Emilie Dupuy, Garden 438. C.
- Rose felicité perpetue, Hort. Belge 205. C.
- gallica var. trigtinipetala, Gar. Chron. 45.
 - Georges Bruant, Am. Gar. 417; Trade Jour. 19.
 - Glorie d'Dijon, Hort. Art Jour. 57. C.
 - Grace Darling, Hort. Belge 7. C.
 - Gustave Regis, Jour. Roses 136. C.
 - Harrison's Yellow \times Rosa rugosa, Am. Gar. 663.
 - Jacqueminot, Vick's Mag. 283.
 - Lady Mary Fitzwilliam, Jour. Roses 184. C.
 - La France, Garden 233. (2.)
 - Madame Eugénie Fremy, Jour. Roses 168. C.
 - Madame Eugène Verdier, Jour. Roses 40. C.
 - Marguerite de Fenelon, Jour. Roses 8. C.
 - Mme. Hoste, Am. Flor. 431.
 - Mrs. Paul, Garden 484. (2.) C.
 - Moss, Vick's Mag. 33. C.
 - Noisette Mademoiselle Adelina Viviani Morel, Jour. Roses 104. C.
 - Papa Gontier, Jour. Roses 72. C.
 - Pink seedling tea, R. N.-Y. 231.
 - Reine Olga de Wurtemberg, Jardin 206.
 - Souvenir de Madame Sablayrolles, Jour. Roses 152. C.
 - Tea, Niphotos, Garden 467.
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 - Viscountess Folkestone, Jour. Roses 120. C.
 - White Baroness, Vick's Mag. 65. C.
 - White Rugosa, Am. Agr. 371.
- Roses, Cherokee, Am. Gar. 668.
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- hispidus, Am. Gar. 642.

- Rubus neglectus*, Am. Gar. 721.
 — *occidentalis*, Am. Gar. 722.
 — *strigosus*, Am. Gar. 723.
 — *villosus*, Am. Gar. 720.
Saccolabium bellinum, Bot. Mag. t. 7142. C.
Salvia prunelloides purpurea, Gart. 563.
 — *splendens* var. *Bruanti*, Am. Flor. 331.
Sarcodes sanguinea, Am. Gar. 600.
Sarracenia decora, Gar. World 777.
Satyrion membranaceum, Bot. Mag. t. 7104. C.
Saxifraga Boydi, Garden 10. (2.) C.
 — *sarmentosa*, Gar. Chron. 237.
Scaphosepalum pulvinare, Bot. Mag. t. 7151. C.
Schinus molle, Jardin 191.
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Sciadopitys verticillata, Garden 499. (2.)
Scolopendrium rhizophyllum, Am. Gar. 225.
 — *vulgare cristatum*, Am. Gar. 226.
 — *lato-digitatum*, Am. Gar. 226.
Scutellaria Costaricana, Hort. Belge 73. C.
Selenipedium caudatum var. *Warszewiczii*, Gar. & For. 285.
Senecio Ghiesbreghtii, Rev. Hort. 492. C.
Sequoia gigantea, Gar. & For. 575.
 — *sempervirens*, Gar. Chron. 303, 306. (2.)
Shortia galacifolia, Garden 204. (2.) C.
Sicana odorifera, Rev. Hort. 516. C.
 — *spherica*, Bot. Mag. t. 7109. C.
Silene pendula compacta, Gar. World 197. (2.)
Skimmia fragrans, Jour. Hort. 427.
Snowflake, Leucojum vernum, Pop. Gar. 47.
Sobralia xantholeuca, Rev. Hort. 12. C.
Solanum macranthum, Gar. Chron. 81.
 — *jasminoides*, Am. Agr. 321.
 — *Wendlandi*, Garden 104. C;
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 — *William's Improved*, Gar. Mag. 130.
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Sonerila orientalis, Ill. Hort. 97. C.
 — *guttulata*, Ill. Hort. 97. C.
 — *picta*, Ill. Hort. 97. C.
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Spinovitis Davidii, Rev. Hort. 465.
Spiræa ariæfolia, Am. Gar. 125.
 — *japonica compacta multiflora*, Gar. Mag. 640. (2.)
 — *opulifolia* L. var. *heterophylla* fol. aur. marg. Gart. 10.
 — *Thunbergii*, Vick's Mag. 36.
 — *trilobata*, Am. Gar. 503.
 — *Van Houttei*, Hort. Art Jour. 93. C.
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 — *Sargent's Weeping*, Pop. Gar. 2.
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 — *Red China*, Pop. Gar. 3.
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Stanhopea Spindleriana, Gart. 625. C.
Stapelia gigantea, Jour. Hort. 359. (2.)
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Sterculia rupestris, Gar. World 489.
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 — *Belmont*, Am. Gar. 521.
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 — *Bubach*, Can. Hort. 240; Pop. Gar. 190, 230.
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 — Edgar Queen, Am. Farm Hort. 4.
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 — Golden Defiance, Pop. Gar. 2. (6.)
 — Haverland, Am. Agr. 417; Am. Gar. 523; Pop. Gar. 48. (6.) 229.
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 — Laxton's Competitor, Jour. Hort. 99. (2.)
 — Lovett, Orch. & Gar. 209.
 — Lower, Pop. Gar. 231.
 — Middlefield, Am. Farm Hort. 1; Orch. & Gar. 176.
 — Monmouth, Pop. Gar. 231.
 — Mrs. Cleveland, Am. Farm Hort. 11.
 — Parker Earle, Can. Hort. 311. C.
 — Pearl, Am. Gar. 417.
 — Sharpless Seedling, Gar. Chron. 43. (2.)
 — Shuster's Gem, Am. Agr. 417; Orch. & Gar. 23.
 — Sterling, Pop. Gar. 48. (6.)
 — Warfield, Am. Agr. 417; Pop. Gar. 231.
 — Waterloo, Jour. Hort. 99. (2.)
 — Wilson, Am. Gar. 517; Pop. Gar. 231.
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 — Kewensis, Hort. Belge 169. C.
 — polyanthus, Jardin 125.
 — Watsoni, Hort. Belge 169. C.
 — White Pet, Hort. Belge 169. C.
 Symphoricarpos occidentalis, Gar. & For. 297.
 Syringa Pekinensis, Gar. & For. 165.
 Taxodium distichum, Gar. Chron. 325; Gar. & For. 155.
 Tecoma grandiflora, Gar. & For. 393.
 — jasminoides, Jour. Hort. 105.
 — radicans, Hort. Art Jour. 96. C.
 Thalictrum Delavayi, Bot. Mag. t. 7152. C; Gar. Chron. 125. (2.)
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 Thunia Bensoniæ, Pop. Gar. 62. (6.)
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 — Cyphomandra betacea, Jour. Hort. 15.
 — Green Gage, Gar. Mag. 193.
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 — Laxton's Open-air, Gar. Mag. 43.
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 — Table Queen, Pop. Gar. 45. (6.)
 — Tree, Trade Jour. 25; Am. Gar. 509; Jour. Hort. 15.
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 Trachycarpus Khasyanus, Bot. Mag. t. 7128. C.
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 — sessile var. Californicum, Gar. & For. 321.
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 Tulipa Archiduc d' Autriche, Rev. Hort. 420. C.
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 — Lac van Rhein, Rev. Hort. 420. C.
 — simple de Gesner, Rev. Hort. 475.
 — — native, Rev. Hort. 474.
 — sylvestris, Rev. Hort. 476.
 Tussilago Farfara, variegata, Garden 435.
 Ursinia pulchra var aurea, Garden 392. C.
 Vanda Amesiana, Bot. Mag. t. 7139. C.
 — coerulea, Gar. Chron. 17; Gar. & For. 77.
 — Orchidophile, 376. C; Gart. 545. C.
 — Kimballiana, Bot. Mag. t. 7112. C; Gar. 322. C.; Jour. Hort. 41.
 — suavis, Gar. Chron. 133; Hort. Belge 157. C.
 — tricolor, var. Patersoni, Gar. Chron. 135.
 Vegetable Marrow, Long Bush, Gar. 594.
 Verbascum Olympicum, Gar. 55. (2.)
 Viburnum pauciflorum, Gar. & For. 5.
 — plicatum, Orch. & Gar. 92.
 — pubescens, Gar. & For. 125.
 Vinca rosea, Vick's Mag. 49.
 Virginia Creeper, Vick's Mag. 317.
 Vitis rutilans, Rev. Hort. 444. C.
 Vriesea Gravisiana, Gart. 495; Hort. Belge 49. C.
 — X Weyringeriana, Gart. 8.
 — Kitteliana, Gart. 327.
 — Mariæ, Jour. Hort. 221.
 Waitzia aurea, Rev. Hort. 523.
 Waldsteinia fragarioides, Rev. Hort. 510.
 Watermelon, Georgia Rattlesnake, Orch. & Gar. 100.
 — Volga, Pop. Gar. 3.
 Wax Plant, Bella, Pop. Gar. 13.
 Weigelas, white flowering, Pop. Gar. 235.
 Willow, Ring-Leaved, Pop. Gar. 50. (6.)
 Wineberry, Japanese, Am. Agr. 515; Am. Farm Hort. 9; Orch. & Gar. 48.
 Wistaria, Chinese, Am. Flor. 587.
 Xanthoceras sorbifolia, Hort. Belge 181. C.
 Xeranthemum annuum, Rev. Hort. 486.
 Yucca gloriosa, Gar. Chron. 693. (2.)
 — gloriosa, var. recurvifolia, Am. Gar. 661.
 Zamia Wallisii, Bot. Mag. t. 7103. C.
 Zenobia speciosa var. pulverulenta, Gar. Chron. 612.
 Zephyranthes Atamasco, Gar. 155.
 — candida, Gar. 154. C.
 Zinnia Haageana flore pleno, Gar. World 37. (2.)

§ 3. *DIRECTORY OF THE NATIONAL, STATE, PROVINCIAL AND OTHER MOST IMPORTANT HORTICULTURAL SOCIETIES IN NORTH AMERICA.*

Alabama Horticultural Society :

Pres., Geo. I. Motz, Huntsville.
Sec., Frank Boykin, Seale.

American Association of Nurserymen :

Pres., S. M. Emery, Lake City, Minn.
Sec., Chas. A. Green, Rochester, N. Y.

American Chrysanthemum Society :

Pres., John Thorpe, Pearl River, N. Y.
Sec., Edwin Lonsdale, Chestnut Hill, Philadelphia.

American Cranberry Growers' Association :

Pres., J. H. Brakeley, Bordentown, N. J.
Sec. and Treas., A. J. Rider, Trenton, N. J.

American Forestry Congress :

Pres., James A. Beaver, Bellefonte, Pa.
Sec., C. C. Birmey, Philadelphia, Pa.

American Horticultural Society :

Pres., Parker Earle, Ocean Springs, Miss.
Sec., E. A. Popenoe, Manhattan, Kan.

American Pomological Society :

Pres., P. J. Berckmans, Augusta, Ga.
Sec., G. B. Brackett, Denmark, Iowa.

American Seed Trade Association :

Pres., Albert McCullough, Cincinnati.
Sec. and Treas., John Fottler, Jr., Boston.

Arizona Fruit Growers' Association :

Pres., Dr. A. J. Chandler.
Sec., H. R. Patrick, Phoenix.

Arkansas Horticultural Society :

Pres., D. L. McLeod, Judsonia.
Sec., W. K. Tipton, Little Rock.

Association of American Cemetery Superintendents :

Pres., Chas. Nichols, Newark, N. J.
Sec., A. H. Sargent, Akron, O.

British Columbia Fruit Growers' Association :

Pres., J. M. Browning, Vancouver.
Sec., A. H. B. MacGowan, Vancouver.

California Fruit Association :

Pres., James A. Webster, Vacaville.
Sec., F. A. Buckingham, Vacaville.

California Fruit Union.

Pres., J. Z. Anderson, San Francisco.
V. Pres. and Sec., L. W. Buck, San Francisco.

California Horticultural Society :

Pres., E. W. Hilgard, Berkeley.
Sec., E. J. Wickson, Berkeley.

California State Board of Horticulture :

Pres., Ellwood Cooper, Santa Barbara.
Sec., B. M. Lelong, San Francisco.

California State Floral Society :

Pres., E. J. Wickson, Berkeley.
Sec., Emory E. Smith, San Francisco.

California Viticultural Commission :

Pres., I. DeTurk, Santa Rosa.
Sec., Winfield Scott, San Francisco.

Cider Makers' Association of the Northwest :

Pres., G. W. Hilliard, Brighton, Ill.
Sec., L. R. Bryant, Princeton, Ill.

Colorado Horticultural Society :

Pres., C. S. Faurot, Boulder.
Sec., Alexander Shaw, Denver.

Connecticut. No state society.

Delaware. No state society.

Dominion Horticultural Association :

Pres., D. P. Penhallow, Montreal.
Sec., W. W. Dunlap, Montreal.

Eastern Nurserymen's Association :

Pres., W. C. Barry, Rochester, N. Y.
Sec., William Pitkin, Rochester, N. Y.

Florida Fruit Exchange :

Pres., Geo. R. Fairbanks, Jacksonville.
Sec., M. P. Turner, Jacksonville.

Florida Horticultural Society :

Pres., Dudley W. Adams, Tangierine.
Sec., E. O. Painter, De Land.

Florida Orange Growers' Union :

Pres., J. C. McKibbin, Pomona.
Sec., A. H. Manville, Palatka.

Foreign Fruit Exchange :

Pres., D. Wegman, New York City.
Sec., F. S. Robinson, New York City.

Georgia Horticultural Society :

Pres., P. J. Berckmans, Augusta.
Sec., T. L. Kinsey, Savannah.

Illinois Horticultural Society :

Pres., Jabez Webster, Centralia.
Sec., A. C. Hammond, Warsaw.

Indiana Horticultural Society :

Pres., E. J. Howland, Howland.
Sec., W. H. Ragan, Greencastle.

Inter-State Shippers' Association :

Pres., A. M. DuBois, Cobden, Ill.
Sec., Thomas Buckle, Villa Ridge, Ill.

Iowa Horticultural Society :

Pres., Eugene Secor, Forest City.
Sec., Geo. Van Houten, Lenox.

Kansas Horticultural Society :

Pres., L. Houk, Hutchinson.
Sec., G. C. Brackett, Lawrence.

Kentucky Horticultural Society :

Pres., R. F. Dulaney, Bowling Green.
Sec., John C. Hawes, Louisville.

Louisiana. No state society.**Maine Pomological Society :**

Pres., Chas. S. Pope, Manchester.
Sec., D. H. Knowlton, Farmington.

Massachusetts Horticultural Society :

Pres., William H. Spooner, Jamaica Plain.
Sec., Robert Manning, Boston.

Michigan Horticultural Society :

Pres., T. T. Lyon, South Haven.
Sec., Edwy C. Reid, Allegan.

Minnesota Horticultural Society :

Pres., Wyman Elliott, Minneapolis.
Sec., S. B. Green, St. Anthony Park.

Mississippi Horticultural Society :

Pres., H. E. McKay, Madison Station.
Sec., W. H. Cassell, Canton.

Missouri Horticultural Society :

Pres., J. C. Evans, Harlem.
Sec., L. A. Goodman, Westport.

Montana. No society.

- Montreal Horticultural Society :
Pres., D. P. Penhallow, Montreal.
Sec., W. W. Dunlap, Montreal.
- Nebraska Horticultural Society :
Pres., F. W. Taylor, Omaha.
Sec., G. J. Carpenter, Fairbury.
- Nevada. No society.
- New Hampshire. No society.
- New Jersey Horticultural Society :
Pres., Ralph Egge, Hopewell.
Sec., E. Williams, Montclair.
- New Mexico Horticultural Society :
Pres., Arthur Boyle, Santa Fé.
Sec., Geo. H. Cross, Santa Fé.
- New York Horticultural Society. Non-active.
- North Carolina Horticultural Society :
Pres., J. Van Lindley, Pomona.
Sec., S. Otho Wilson, Raleigh.
- North Dakota. No society.
- Nova Scotia Fruit Growers' Society :
Pres., Henry Chipman, Grand Pré.
Sec., C. R. H. Starr, Wolfville.
- Ohio Horticultural Society :
Pres., Geo. W. Campbell, Delaware.
Sec., W. W. Farnsworth, Waterville.
- Ontario Fruit Growers' Association :
Pres., A. M. Smith, St. Catharines.
Sec., L. Woolverton, Grimsby.
- Oregon Horticultural Society :
Pres., J. R. Cardwell, Portland.
Sec., E. R. Lake, Corvallis.
- Oregon Pomological Society.
Pres., E. P. Roberts, The Dalles.
Sec., J. A. Varney, The Dalles.
- Oregon State Board of Horticulture :
Pres., J. R. Cardwell, Portland.
Sec., Ethan W. Allen, Portland.
- Peninsular Horticultural Society :
Pres., John J. Black, New Castle, Del.
Sec., Wesley Webb, Dover, Del.
- Pennsylvania Horticultural Society :
Pres., G. W. Childs, Philadelphia.
Sec., D. D. L. Farson, Philadelphia.

Pennsylvania State Horticultural Association :

Pres., H. C. Snively, Lebanon.
Sec., E. B. Engle, Waynesboro'.

Rhode Island Horticultural Society :

Pres., Edward I. Nickerson, Providence.
Sec., Chas. W. Smith, Providence.

Society of American Florists :

Pres., M. H. Norton, Boston.
Sec., W. J. Stewart, Boston, Mass.

South Carolina Horticultural Society :

Pres., H. B. Buist, Greenville.
Sec., G. Wanner, Walhalla.

South Dakota Horticultural Society :

Pres., H. C. Warner, Forestburg.
Sec., C. A. Keffer, Brookings.

Tennessee. No society.**Texas Horticultural Society :**

Pres., E. W. Kirkpatrick, McKinney.
Sec., D. H. Watson, Brenham.

Texas State Nurserymen's Association :

Pres., E. W. Kirkpatrick, McKinney.
Sec., J. M. Howell, Dallas.

Utah. No society.**Vermont. No society.****Virginia Pomological Society. Non-active.****Washington Horticultural Society :**

Pres., Henry Bucy, Tacoma.
Sec., A. N. Miller, Puyallup.

West Virginia. No society.**Western New York Horticultural Society :**

Pres., W. C. Barry, Rochester.
Sec., John Hall, Rochester.

Western Nurserymen's Association :

Pres., G. J. Carpenter, Fairbury, Neb.
Sec., J. W. Schoette, St. Louis, Mo.

West Tennessee Horticultural Society :

Pres., J. C. Tharp, Gibson.
Sec., A. A. Cawdery, Gadsden.

Wisconsin Horticultural Society :

Pres., M. A. Thayer, Sparta.
Sec., B. S. Hoxie, Evansville.

Wyoming. No society.

§ 4. *DIRECTORY OF HORTICULTURISTS, OR THOSE
IN CHARGE OF HORTICULTURAL WORK,
OF EXPERIMENT STATIONS IN NORTH
AMERICA.*

Alabama :

P. H. Mell, M. E., Ph. D., Auburn, Botanist and Meteorologist.
Geo. F. Atkinson, Ph. D., Auburn, Biologist.

Arkansas :

A. B. McKay, B. S., Fayetteville, Horticulturist.

California :

E. J. Wickson, A. M., Berkely, Supt. of Grounds.

Canada (Agricultural College) :

J. Hoyes Panton, Guelph, Botanist.

Canada (Central Experimental Farm) :

John Craig, Ottawa, Horticulturist.

Colorado :

C. S. Crandall, M. S., Fort Collins, Botanist and Horticulturist.

Connecticut (State Station) :

Roland Thaxter, Ph. D., New Haven, Mycologist.

Delaware :

M. H. Beckwith, Newark, Horticulturist and Entomologist.

Florida :

James C. Neal, Ph. D., M. D., Lake City, Botanist and Entomologist.

Georgia :

Gustave Speth, Griffin, Horticulturist.

Illinois :

Thomas J. Burrill, Ph. D., Champaign, Horticulturist and Botanist.

Indiana :

James Troop, M. S., LaFayette, Horticulturist.

Iowa :

J. L. Budd, M. H., Ames, Horticulturist.

Kansas :

Edward A. Popenoe, A. M., Manhattan, Horticulturist.

Kentucky :

H. Garman, Lexington, Entomologist and Botanist.

Maine :

W. M. Munson, B. S., Orono, Horticulturist.

Maryland :

Thomas L. Brunk, B. S., College Park, Horticulturist.

Massachusetts (Hatch Station) :

Samuel T. Maynard, B. S., Amherst, Horticulturist.

Michigan :

L. R. Taft, M. S., Agricultural College, P. O., Horticulturist.

Minnesota :

Samuel B. Green, B. S., St. Anthony Park, Horticulturist.

Mississippi:

Howard E. Weed, M. S., Agricultural College, P. O., Horticulturist and Entomologist.

Missouri:

J. W. Clark, B. S., Columbia, Horticulturist and Entomologist.

Nebraska:

Charles E. Bessey, Ph. D., Lincoln, Director and Botanist.

Nevada:

R. H. McDowell, B. S., Reno, Agriculturist and Horticulturist.

New Jersey:

Byron D. Halstead, Sc. D., New Brunswick, Botanist and Horticulturist.

New Mexico:

A. E. Blount, A. M., Las Cruces, Agriculturist and Horticulturist.

New York (Cornell):

L. H. Bailey, M. S., Ithaca, Horticulturist.

New York (State):

C. E. Hunn, Geneva, Acting Horticulturist.

George W. Churchill, Geneva, Acting Pomologist.

North Carolina:

W. F. Massey, C. E., Raleigh, Horticulturist.

North Dakota:

C. B. Waldron, B. S., Fargo, Arboriculturist.

Oregon:

George Coote, Corvallis, Horticulturist.

Pennsylvania:

George C. Butz, M. S., State College, Centre Co., Horticulturist.

Rhode Island:

L. F. Kinney, B. S., Kingston, Horticulturist.

South Carolina:

E. A. Smyth, Jr., A. B., Columbia, Botanist and Entomologist.

South Dakota:

Charles A. Keffer, Brookings, Supt. Forestry and Horticultural Experiments.

Tennessee:

R. L. Watts, B. Ag., Knoxville, Horticulturist.

Texas:

S. A. Beach, B. S., College Station, Horticulturist.

Utah:

E. S. Richmond, B. S., Logan, Horticulturist and Entomologist.

Vermont:

B. W. Minott, B. S., Burlington, Horticulturist.

Virginia:

W. B. Alwood, Blacksburg, Botanist and Entomologist.

West Virginia:

Charles F. Millsbaugh, M. D., Morgantown, Botanist and Microscopist.

Wisconsin:

Emmett S. Goff, Madison, Horticulturist.

§ 5. THE BOTANIC GARDENS OF THE WORLD
(WITH CORRECTIONS TO DATE BY PRO-
FESSOR D. P. PENHALLOW).

ALGERIA—I.

Algiers, Jardin d'Acclimation du Hamma, Charles Rivière, Director.

AUSTRALIA—4.

Adelaide, (South Australia), Dr. R. Schomburgk, Director.

Brisbane (Queensland).

Melbourne (Victoria).

Sidney (New South Wales), Charles Moore, F. L. S., Director.

AUSTRO-HUNGARY—I4.

Brunn, Botanic Gardens, Prof. Alex. Makovsky, Director.

Budapest (Transylvania), University Botanic Garden, Dr. L. Juranyi, Director.

Caernowitz (Bukovia), University Botanic Garden, Dr. Ed. Tangl, Dir.

Graz (Styria), University Botanic Garden, Dr. G. Haberlandt, Dir.

Innsbruck (Tyrol), University Botanic Garden, Dr. Emil Heinricher, Director.

Klagenfurt (Carinthia), Baron Marcus V. Jabornegg-Gamsenegg, Dir.

Kolozsvár (Transylvania), Royal Botanic Garden, Dr. Aug. Kanitz, Dir.

Krakau (Galicia), University Botanic Garden, Dr. Jos. Thom. De Rostański, Director.

Lemberg (Galicia), University Botanic Garden, Dr. Th. Ciesielki, Dir.

Prague (Bohemia), University Botanic Garden, Dr. M. Willkomm, Dir.

Schemnitz (Transylvania), Prof. Ludwig Fekete, Director.

Trieste (Istria), Raimondo Tominz, Director.

Vienna, University Botanic Garden, Dr. A. J. Kerner, Director.

Vienna, Imperial Horticultural Gardens of Hofburg, Fr. Antoine, Dir.

BELGIUM—5.

Antwerp, Dr. H. Van Heurck, Director.

Brussels, Royal Botanic Gardens, François Crépin, Director.

Ghent, University Botanic Garden, Dr. J. J. Kickx, Director.

Gembloux, Botanic Garden of the Agricultural Institute, Dr. C. Malaise, Director.

Liege, University Botanic Garden.

BRAZIL—2.

Rio de Janeiro, Botanic Gardens of the Agricultural Institute, at Corrigez, Dr. Nicolau J. Moreira, Director.

Rio de Janeiro, Government Botanic Gardens, Dr. J. B. Rodrigues, Director.

CANADA—I.

Montreal (P. Q.), McGill University Botanic Garden, Prof. D. P. Penhallow, Director.

CANARY ISLANDS—I.

Orotava (Teneriffe), Jardin d'Acclimatation, Mr. Wildpret, Chief Gardener.

CAPE OF GOOD HOPE—3.

Cape Town, Prof. MacOwan, Director.

Graaf Reinet, J. C. Smith, Chief of the Garden.

Graham's Town, Edward Tidmarsh, Chief of the Garden.

CEYLON—I.

Peradeniya, Royal Botanic Garden, Dr. Henry Trimen, Director.

CHILI—I.

Santiago, Prof. Fred. Philippi (fils), Director.

CHINA—I.

Hong Kong, Government Botanic Gardens, A. B. Westland, Supt.

COCHIN CHINA—I.

Saigon, Colonial Botanic Garden, Dr. Regnier, Director.

DENMARK—2.

Copenhagen, University Botanic Gardens, Prof. Eug. Warming, Dir.

Copenhagen, Royal Gardens of Rosenberg, Tyge Rothe, Director.

ECUADOR—I.

Quito, Prof. R. P. Al Sodi, Director.

EGYPT—I.

Cairo, Gastinel-Bey, Director.

FRANCE—20.

Angers, Dr. Em. Lieutaud, Director.

Besancon, F. Paillot, Director.

Caen, Otto Lignier, Director.

Cannes, Comte d'Emprémesnil, Director.

Clermont-Ferrand.

Dijon, Dr. Laguesse, Director.

Hyeres, Emile Davrillon, Director.

Lille, T. Meurein, Director.

Lyon, Dr. Ant. Magnin, Director.

Montpellier.

Nancy, Prof. G. Le Monnier, Director.

Nantes, Dr. Ecorchard, Director.

Orleans, M. Rossignol, Director.

Paris, Gardens of the National History Museum, Prof. Maxime Cornu, Director.

Rochefort, Dr. Barallier, Director.

Rouen, Emm. Blanche, Director.

St. Quentin, Charles Magnier, Director.

FRANCE, continued.

Toulon, J. B. Chabaud, Chief Gardener.
Toulouse, Dr. Dominique Clos, Director.
Tours, Prof. David Barnsby, Director.

GERMANY—36.

Aix-la-Chapelle, Botanic Gardens, Dr. A. Förster, Director.
Bamberg (Bavaria), Dr. Funk, Director.
Berlin, Royal Botanic Gardens, Prof. A. Engler, Director.
Berlin, University Botanic Gardens, Dr. S. Schwendener, Director,
Bonn (Rhenish Prussia), University Botanic Gardens, Dr. Ed. Strasburger, Director.
Breslau (Silesia), University Botanic Gardens, Dr. K. Prantl, Director.
Brunswick (Brunswick), Botanic Garden of the Polytechnic School.
 Dr. W. Blasius, Director.
Carlsruhe (Baden), J. Pfister, Director.
Cologne (Rhenish Prussia), Prof. J. Niepraschk, Director.
Darmstadt (Hesse), Botanic Garden of the Polytechnic School, Dr. Leopold Dippel, Director.
Dresden (Saxony), Royal Botanic Garden, Dr. Oscar Drude, Director.
Erlangen (Bavaria), University Botanic Garden, Dr. Max. Rees, Dir.
Frankfort-on-Main (Hesse-Nassau), Botanic Garden of the Medical Institute, ———, Director.
Freiburg (Baden), University Botanic Garden, Dr. F. Hildebrand, Dir.
Giessen (Hesse), University Botanic Garden, Dr. H. Hoffmann, Dir.
Görlitz (Silesia), Dr. R. Peck, Director.
Göttingen, University Botanic Garden, Dr. Peter, Director.
Greifswald (Pomerania), University Botanic Garden, Dr. Fr. Schmitz, Director.
Halle-upon-Salle (Saxony), University Botanic Garden, Dr. Greg. Kraus, Director.
Hamburg, Dr. Sadebeck, Director.
Heidelberg (Baden), University Botanic Garden, Dr. E. Pfitzer, Dir.
Jena (Saxe-Cobourg), University Botanic Garden, Dr. E. Stahl, Dir.
Kiel (Schleswig-Holstein), University Botanic Garden, Prof. J. Reinke, Director.
Königsberg, University Botanic Garden, Dr. Chas. Leursen, Director.
Leipzig (Saxony), University Botanic Garden, Dr. Aug. Schenck, Dir.
Marbourg (Hesse-Nassau), University Botanic Garden, Dr. A. Wigand, Director.
Münden (Hanover), Forestry Botanic Garden, ———, Director.
Munich (Bavaria), Dr. C. G. Von Naegeli, Director.
Münster (Westphalia), Botanic Garden of the Academy, Dr. O. Brefeld, Director.
Potsdam, Dr. Juhlke, Director.
Rostock (Mecklenburg), University Botanic Garden, Dr. H. Göbel, Director.
Strasbourg (Alsace-Lorraine), University Botanic Garden, Comte Herm. de Solms-Laubach, Director.
Tharand (Saxony), Forestry Academy Garden, Dr. Fred. Nobbe, Dir.

GERMANY, continued.

Tubingen (Wurtemberg), University Botanic Garden, Dr. W. Pfeffer, Director.

Wurzburg (Bavaria), University Botanic Garden, Dr. Jul. von Sachs, Director.

GREAT BRITAIN AND IRELAND—I2.

Birmingham (England), Mr. Latham, Director.

Cambridge (England), University Botanic Garden, Dr. Francis Darwin, Director.

London (England), Chelsea Botanic Gardens, Thos. Moore, Curator.

London (England), Royal Botanic Gardens, Kew, Prof. W. T. T. Dyer, Director.

London (England), Royal Botanic Gardens, Regent's Park, W. Coomber, Superintendent.

London (England), Royal Horticultural Society Gardens, South Kensington, A. F. Barron, Superintendent.

Manchester (England), Bruce Findlay, Curator.

Oxford (England), University Botanic Garden, Dr. S. H. Vines, Dir.

Dublin (Ireland), Royal Botanic Gardens of Glasnevin, Dr. Moore, Director.

Belfast (Ireland), Royal Belfast Botanic Gardens, R. Motherell, Sec'y.

Edinburgh (Scotland), Royal Botanic Gardens, I. B. Balfour, Director.

Glasgow (Scotland), R. Bullen, Curator.

GREECE—I.

Athens, Dr. T. de Heldreich, Director.

GUATEMALA—I.

Guatemala, Dr. Francesco Abella, Director.

GUIANA—I.

Georgetown, G. S. Jenman, Superintendent.

HOLLAND—4.

Amsterdam, Prof. C. A. J. A. Oudemans, Director.

Groningen, Prof. P. De Boer, Director.

Leyden, Dr. W. F. R. Suringar, Director.

Utrecht, Dr. N. W. P. Rauwenhoff, Director.

INDIAN EMPIRE—8.

Bangalore (Madras), Col. W. L. Johnson, Director.

Bombay, A. Shuttleworth, Director.

Calcutta, Royal Botanic Gardens, Prof. G. King, Director.

Ganish Kind (Poona), G. W. Woodrow, Director.

Mysore, Government Botanic Gardens, ———, Director.

Ootacamud, Mr. Jamieson, Director.

Pondichery.

Saharanpur and Mussourie (Bengal), Government Botanic Gardens, F. J. Duthie, Director.

ITALY—23.

Bologne.

Cagliari, Dr. P. Gennari, Director.

Caserta, Dr. N. Terracciano, Director.

Catania, Prof. Fr. Tornabene, Director.

Ferrara, Dr. Carus Massalongo, Director.

Florence, Prof. T. Caruel, Director.

Genoa, Prof. Fred. Delpino, Director.

Lucca, Dr. C. Bicchi, Director.

Messina, Prof. A. Borzi, Director.

Milan, Prof. Fr. Ardissoni, Director.

Modina, Dr. A. Mori, Director.

Naples, Dr. J. A. Pasquale, Director.

Padova, Cav. Dr. P. A. Saccardo, Director.

Palermo, Dr. Aug. Todaro, Director.

Parma, Prof. J. Passerini, Director.

Pavia, Prof. J. Briosi, Director.

Perouse, Prof. Al. Bruschi, Director.

Pisa, Dr. J. Arcangeli, Director.

Portici, Dr. Horace Comes, Director.

Rome, Dr. R. Pirrotta, Director.

Siena, Prof. Att. Tassi, Director.

Turin, Prof. G. Gibelli, Director.

Venice, Sen. Ruchiner, Director.

JAPAN—2.

Tokio, Koiskekowa Botanic Gardens, Prof. K. Ito, Director.

Sapporo, Government Botanic Gardens, Dr. K. Miyabe, Director.

JAVA—I.

Buitenzorg, Dr. M. Treub, Director.

MALTA—I.

La Valette, Dr. Gavino Gulia, Director.

MAURITIUS—I.

Port Louis, J. Horne, Director.

NATAL—I.

D'Urban, Natal Botanic Gardens. J. Medley Wood, Curator.

NEW ZEALAND—I.

Christchurch, J. B. Armstrong, Director.

PERU—I.

Limá, Dr. Mig. de los Rios, Director.

PHILIPPINE ISLANDS—I.

Manilla (Luzon), ———, Director.

PORTUGAL—3.

Coimbra, Dr. J. A. Hienriques, Director.

Lisbon, Prof. J. de Andrade Corvo, Director.

Oporto, Dr. F. de S. G. Cardoso, Director.

REUNION, ISLAND OF—I.

St. Denis, M. Richard, Director.

ROUMANIA—2.

Bucharest, Dr. Brandza, Director.

Yassy, Dr. A. Fêtu, Director.

RUSSIA—I6.

Dorpat (Livonia), Dr. Ed. Russow, Director,

Helsingfors (Finland), ———, Director.

Kazan (Kazan), Prof. N. W. Sorokin, Director.

Kharkoff, Prof. W. Palladin, Director.

Kiev, Dr. J. Schmalhausen, Director.

Moscow, Dr. J. Goroschankin, Director.

Nikita (Crimea), Mr. Basarow, Director.

Odessa, Dr. L. Reinhard, Director.

Orel, P. G. Tretjakoff, Director.

Ouman (Kiev), Prof. L. Scrobichewski, Director.

Penza (Penza).

St. Petersburg, Imperial Botanic Gardens, Dr. Ed. de Regel, Director.

St. Petersburg, University Botanic Gardens, Prof. André Bikitoff,
Director.

Tiflis, Prof. W. Scharrer, Director.

Woronesh, Dr. J. E. Fischer, Director.

Warsaw, Dr. A. F. de Waldheim, director.

SCANDINAVIA—7.

Christiania (Norway), Dr. F. C. Schubeler, Director.

Göteborg (Sweden), Hort. Soc. Bot. Gardens, Prof. C. Löwegren,
Director.

Lund (Sweden), Dr. F. W. C. Areschong, Director.

Stockholm (Sweden), Gardens of the Royal Academy of Agriculture,
Dr. V. Wittrock, Director.

Stockholm (Sweden), Royal Gardens of Haga, Prof. M. A. Werner,
Director.

Stockholm (Sweden), Swedish Society of Horticultural and Botanical
Gardens, M. A. Pital, Director

Upsala (Sweden), Dr. Th. M. Fries, Director.

SERVIA—I.

Belgrade, ———, Director.

SIBERIA—I.

Tomsck, Mr. Schestakoff, Director.

SPAIN—2.

Madrid, Dr. Miguel Colmeiro, Director.

Valencia, Dr. José Arévalo Boca, Director.

STRAITS SETTLEMENTS—I.

Singapore, N. Cantley, Director.

SWITZERLAND—3.

Basle, Dr. H. Vöchting, Director.

Berne, Dr. L. Fischer, Director.

Zurich.

TASMANIA—I.

Hobart Town, Mr. Abbot, Director.

UNITED STATES—5.

Brookline (Mass.), Arnold Arboretum of Harvard College, Prof. C. S. Sargent, Director.

Cambridge (Mass.), Harvard College Botanic Gardens, Dr. G. S. Goodale, Director.

Lansing (Michigan), Botanic Garden of State Agricultural College, Dr. W. J. Beal, Director.

St. Louis (Missouri), Missouri Botanic Gardens, Dr. Wm. Trelease, Director.

Washington (D. C.), U. S. Dept. of Agriculture Gardens, Wm. Saunders, Superintendent.

WEST INDIES—6.

Havana (Cuba), J. Lachaume, Director.

King's House (Jamaica), Wm. Harris, Superintendent.

Kingston (Jamaica), Government Botanic Gardens, Wm. Fawcett, Dir.

St. Aurris (Trinidad), Government Botanic Gardens, H. Prestoe, Dir.

St. Pierre (Martinique), Colonial Botanic Gardens, M. Thierry, Dir.

§ 6. *TITLE INDEX TO EXPERIMENT STATION
HORTICULTURE IN NORTH AMERICA FOR
1890 (INCLUDING PUBLICATIONS OF THE DE-
PARTMENT OF AGRICULTURE.)*

It is impossible to draw a sharp line of separation between horticulture and other divisions of general agriculture ; but the following lists (sections 6 and 7) have been made sufficiently comprehensive to include all that can possibly be called horticulture, and some entries may, perhaps, belong rather to general farming.

Explanation.—The figures in the left margin are the numbers of the bulletins and reports. If the number stands independently it indicates that the bulletin contains only horticultural matter ; but when it stands in a parenthesis, the bulletin contains other matter than that which is indexed. A few bulletins dated late in 1889 had not been received when the previous volume was printed and they are inserted in this list.

ALABAMA :

A. Agricultural Experiment Station.

- 10. Grape Culture. Jan. *J. S. Newman.*
- 11. Peaches and Plums. Feb. *J. S. Newman.*
- 15. Insecticides. April. *G. F. Atkinson.*
- (17.) London Purple for the Cotton Worm. July. *G. F. Atkinson.*
- 20. Small Fruits and Vegetables [Strawberries, Raspberries, Musk Melons, Water Melons, Beans, Tomatoes, Onions]. November. *J. S. Newman and Jas. Clayton.*

B. Canebrake Experiment Station.

- (7.) Peas.

ARKANSAS :

- (12.) Insects. April. *C. W. Woodworth.*
- 13. Strawberries. Aug. *J. McNeill.*
- 14. Effects of the Arsenites upon Plants. Sept. *C. W. Woodworth.*
- 15. Some New Insecticides. Dec. *C. W. Woodworth.*

CALIFORNIA.

- 85. Observations on Olive Varieties. Feb. *E. W. Hilgard.*
- 86. Preservative Fluids for Fresh Fruits. The Sulphuring of Dried Fruits. May. *E. W. Hilgard.*

CANADA :

A. Agricultural College (Guelph).

- LII. Black-knot on Plums. June.

B. Central Experimental Farm (Ottawa).

- (1889 report.) Horticulturist's report [Small Fruits and Vegetables]. *W. W. Hilborn.* Report of Entomologist and Botanist [Various Injurious Insects]. *James Fletcher.*

DELAWARE :

- (VIII.) The Value of Sulphide of Potassium as a Remedy against Pear Scab. *F. D. Chester*. London Purple as a Remedy against Codlin Moth. *M. H. Beckwith*. March.
- (X.) Fungicides. Oct. *M. H. Beckwith*.

COLORADO :

- (2nd report.) Report of Section of Botany and Horticulture [Apple, Pears and Ornamental Trees, Grapes, Strawberries, Gooseberries, Currants, Potatoes, Sweet Corn, Peas, Celery, Onions, Cabbages, Tomatoes, Carrots, Pumpkins and Squashes, The Growing of Seeds for Distribution, Insects and Insecticides]. 1889. *Max C. Brose*.

CONNECTICUT :

- (97.) Fungous Diseases of Plants. April. *Roland Thaxter*.
- 102. Fungicides. March. *Roland Thaxter*.
- (105.) Potato Scab. December. *Roland Thaxter*.

FLORIDA :

- 9. Insects and Insecticides. April. *James C. Neal*.
- (11.) Irish Potatoes. Oct.

GEORGIA :

- (6.) The Potato Sphinx. The Twig Girdler. Jan. *J. P. Campbell*.
- (7.) Notes on a Destructive Insect. April. *J. P. Campbell*.
- 8. Potato Experiment. July. *Gustave Speth*.
- (10.) Corn. Dec.

INDIANA :

- 31. Small Fruits and Vegetables. April. *James Troop*.
- (33.) Small Fruits. Entomological Notes. Nov. *James Troop*.

IOWA :

- (9.) Plum Curculio and the Plum Gouger. May. *C. P. Gillette*.
- (10.) Experiments with Arsenites. *C. P. Gillette*. Stocks for the Cherry, Plum, Prune and Apricot. *J. L. Budd*. Aug.
- (11.) The Potato Stalk-Weevil and Remedies. The Apple Curculio and Remedies. A New Currant Borer. Nov. *C. P. Gillette*.

KANSAS :

- 10. Notes on Conifers. May. *E. A. Popenoe*.
- (12.) Fungicides. Aug. *W. A. Kellerman*.
- 14. Winter Protection of Peach Trees. Notes on Grapes. Dec. *E. A. Popenoe*.

KENTUCKY :

- Circular No. 3. Insecticides, Fungicides, Orchard Treatment.
- 25. Strawberries. April. *James Murray*.
- 31. Some Strawberry Pests. Dec. *H. Carman*.

LOUISIANA :

- 3. Large Fruits and Various Vegetables. *H. A. Morgan*.
- 4. Irish Potatoes. Diseases of Potatoes. *H. A. Morgan* and *J. G. Lee*.

MARYLAND :

- (9.) Strawberries. June. *W. H. Bishop*.
 (1889 report.) The Tomato. *E. Lewis Sturtevant*. Report of the Horticulturist [various tests with Tomatoes, Potato Experiment, General Notes on Vegetables]. *W. H. Bishop*.

MASSACHUSETTS :

A. *Hatch Experiment Station*.

- (7.) Small Fruits [Blackberries and Raspberries]. Girdling the Grape Vine. Report upon Vegetables [Tomatoes, Sweet Corn, Lettuce, Potatoes]. Combined Fungicides and Insecticides in Potato Growing. Protection of Fruit Trees from Mice, Rabbits and Woodchucks. Jan. *S. T. Maynard*.
 (8.) Experiments in Greenhouse Heating. April. *S. T. Maynard*.
 10. Special Fertilizers for Greenhouse Crops [Carnations, Pansies, Lettuce, Tomato Plants, Raspberries, Blackberries and Strawberries.] Oct. *S. T. Maynard*.
 (11.) Insecticides, Fungicides.
 (1889 report.) Division of Entomology [Jumping Sumach Beetle, Bud Moth and Remedies, Grape-Vine Leaf-Hopper, Ants, Experiments with Remedies, Alum not Destructive to Currant Worms, Poisonous Doses of Insecticides]. *C. H. Fernald*. Division of Horticulture [Plant Bed Cloth as a Substitute for Glass, Protection of Peach Buds from Injury by Cold, Girdling Apple Trees, Girdling Grape-Vines, Protecting Trees from Mice, Reports on Varieties of Apples, Pears, Peaches, Plums, Cherries and Grapes, Raspberries, Blackberries and Strawberries]. *S. T. Maynard*.

B. *State Experiment Station*.

- (34.) Potato Scab. June. *Jas. Ellis Humphrey*.
 (7th report.) General Account of Fungi. Potato Scab. 1889. *Jas. Ellis Humphrey*.

MICHIGAN :

57. Experiments with Vegetables [Tomatoes, Potatoes, Beets, Cabbages, Cauliflower, Corn, Lettuce, Peas and Radishes]. March. *L. R. Taft*.
 58. Insecticides. March. *A. J. Cook*.
 59. List of Fruits for Michigan. Notes on Vegetables. Arsenites for the Codlin Moth. The Plum Curculio. Black Knot. *L. R. Taft*. Notes on The Fungus of Apple Scab. *B. T. Galloway*. Treatment of Apple Scab in Michigan. *L. R. Taft*. April.
 (60.) Potatoes. April. *E. Davenport*.
 63. Greenhouse Building and Heating. July. *L. R. Taft*.
 67. Fruit Testing. Oct. *T. T. Lyon*.

MINNESOTA :

9. Description and Value of Russian Willows and Poplars for Minnesota. *Samuel B. Green*. Insects Affecting Poplars and Willows. *Otto Luggen*. Nov. 1889.
 10. Experiments with Onions and Cabbages. Spraying with London Purple to Kill the Curculio on Our Native Plums. Bagging

MINNESOTA, continued.

- Grapes. Rollingsstone Plum. Potatoes at Different Depths. *Samuel B. Green.* Oak Caterpillars. *Otto Luggen.* March.
- (11.) Peas, Beans and other Crops. June. *Willet M. Hays.*
- (12.) Preserving Vegetables in Carbonic Acid Gas. American Grown Cauliflower Seed. July. *Samuel B. Green.*

MISSOURI:

- 10. Analyses of Apples at Various Stages of growth. Bordeaux Mixture for Grape Rot. Experiments with Small Fruits and Potatoes. April. *J. W. Clark.*

NEBRASKA:

- (12.) Potatoes, Sweet Potatoes, Beans. Peas, Onions, Radishes, Parsnips, Salsify, Beets, Carrots, Turnips, Ground Cherries, Cucumbers, Muskmelons, Watermelons and Pumpkins. Feb. *Jared G. Smith.*
- 14. Injurious Insects. June. *L. Bruner.*
- (15.) Peas, Lettuce and Radishes. Sept. *Jared G. Smith.*

NEVADA:

- 8. The Codlin Moth. Jan. *F. H. Hillman.*
- 9. A Serious Rose Pest. May. *F. H. Hillman.*
- 10. The Pear and Cherry Slug. July. *F. H. Hillman.*
- 11. Plant-Lice Infesting the Apple. Sept. *F. H. Hillman.*

NEW JERSEY:

- 70. Some Fungous Diseases of the Spinach. July. *Byron D. Halsted.*
- 72. Various Injurious Insects, and How to Deal With Them. Oct. *John B. Smith.*
- 76. Some Fungous Diseases of the Sweet Potato. Nov. *Byron D. Halsted.*
- Special Bulletin K. Insects affecting Cranberries. Feb. *John B. Smith.*

NEW YORK:

A. Cornell University Experiment Station (Ithaca).

- XVIII. The Effect of London Purple and Paris Green upon Peach Foliage. Trials of Nozzles. July. *L. H. Bailey.*
- XIX. Report upon the Condition of Fruit-Growing in Western New York. Aug. *L. H. Bailey.*
- XXI. Tomatoes. Oct. *L. H. Bailey* and *W. M. Munson.*
- XXIII. Insects Injurious to Fruits. Dec. *J. H. Comstock* and *M. V. Slingerland.*
- (XXV.) The Hollyhock Rust. *W. R. Dudley.* The Forcing of Beans. Influence of Latitude upon Potatoes; a Criticism. Notes upon Methods of Herbaceous Grafting. The Influence of Depth of Transplanting upon the Heading of Cabbages. Peach Yellows. The Paper Flower Pot. Experiences in Crossing Cucurbits. *L. H. Bailey.* Dec.

B. State Experiment Station (Geneva).

- Circular. Methods Adopted for the Systematic Testing of Small

NEW YORK, continued.

Fruits. A List of Fruits at the Station. A List of Trees Planted at the Arboretum. March. *C. E. Hunn* and *G. W. Churchill*.

24. Strawberries. Oct.

NORTH CAROLINA:

- (72). Apples, Pears, Peaches, Plums, Cherries, Quinces, Nuts, Grapes, Figs, Raspberries, Blackberries, Strawberries, Currants, Gooseberries, Osier Willows. June. *W. F. Massey*.
74. Tests of Garden Vegetables and Fruits. Dec. *W. F. Massey*.

OHIO:

1. Experiments with Potatoes. Jan. *W. J. Green*.
(4). Spraying to Prevent Insect Injury. Bark-Lice of the Apple and Pear. The Buffalo Tree Hopper. Fungous Diseases of Plants and Remedies. *Clarence M. Weed*. Directions for Collecting, Preserving and Studying Plants. *Freda Detmers*. April.
7. Strawberries and Raspberries. Aug. *W. J. Green*.
(8). Plum Curculio Experiment. Remedies for Striped Cucumber Beetle. The Rhubarb Curculio. Potato Blight Experiment. Sept. *Clarence M. Weed*.
9. Experiments with Asparagus. Transplanting Onions. Oct. *W. J. Green*.
10. Preventing Downy Mildew or Brown Rot of Grapes. *Clarence M. Weed*. The Smut of Indian Corn. *C. E. Bessey*. Nov.
(2, Vol. 1, Technical Series.) Flowering Plants. *Moses Craig*. Fourth Contribution to Life History of Little Known Plant-Lice. *Clarence M. Weed*. May.

OREGON:

- (4). Notes on Vegetables, Ornamental Trees and Shrubs, Orchards and Small Fruits. Jan. *E. R. Lake*.
(5). Some Injurious Insects and Remedies. April. *F. L. Washburn*.
7. Comparative Tests of Small Fruits and Vegetables. Oct. *George Coote*.

PENNSYLVANIA:

- (10). Should Farmers raise their own Vegetable Seeds? Notes on New Varieties of Vegetables (Beans, Cabbages, Cauliflower, Sweet Corn, Celery, Peas, Radishes and Tomatoes). Jan. *Geo. C. Butz*.
13. Black Knot on Plums. A few Ornamental Plants. Oct. *Geo. C. Butz*.

RHODE ISLAND:

- (7). Catalogue of Fruits. Results of Wintering Outside and in the Cellar. June. *L. F. Kinney*.
(Second report). Fruits and Vegetables. *L. F. Kinney*.

SOUTH CAROLINA :

- (2nd report.) Entomology (Cabbage Butterfly, Genus *Colias*, A New Butterfly for South Carolina, Insects of the Fig). Botany (Compositæ). *Ellison A. Smyth, Jr.*

SOUTH DAKOTA :

18. Cut-Worm and Remedies. March. *I. H. Orcutt.*

TENNESSEE :

1. Experiments in Growing Potatoes. Jan. *C. S. Plumb.*
Special Bulletin C. Treatment of Fungus Diseases. *F. Lamson Scribner.*
- (2nd report.) Report of the Division of Botany and Horticulture (A "grass-garden," Diseases of some Small Fruits and Vegetables.) *F. Lamson Scribner.* Report of the Entomologist (European Cabbage Butterfly, Southern Cabbage Butterfly, Harlequin Cabbage Bug, Plum Curculio, Nematode Worms, Experiments with Arsenites). *H. E. Summers.* 1889.
5. Fruit Trees at the Experiment Station (Apple, Peach, Pear, Nectarine, Apricot, Cherry, Plum, Fig.). Dec. *R. L. Watts.*

TEXAS :

- (7). Fungus on Forest and Apple Trees. The Pear. Fungi on Sweet Potatoes, Treatment of Forest and Apple Trees. Nov. 1889. *L. H. Pammel.*
- (8). Notes on Experimental Vineyards. Powdery Mildew, Black Rot, Grape Leaf Blight, Leaf Spot Disease, Anthracnose. Notes on Strawberries, Blackberries and Raspberries. Best Varieties of Fruits for Texas. List of Fruits Growing in Experimental Grounds. Dec. 1889. *T. L. Brunk.*
- (9). Pear Stocks. *T. L. Brunk.* Some Parasitic Fungi of Texas, with Notes. *H. S. Jennings.* May.

UNITED STATES (Department of Agriculture) :

A. Division of Pomology.

Bulletin 3. Classification and Generic Synopsis of the Wild Grapes of North America. *T. V. Munson.*

- (1889 report.) Procuring and Distributing Seeds, Plants and Scions of Fruits. Fruits ordered from Foreign Countries (Asiatic Persimmon, Fig, Asiatic Peaches, Grape, Date, Citron). Native Fruits (Chestnut, Plum, Currant, Apple, Pear). Grape Syrup. A Fruit Ladder. Fruit Growing in Florida. Tropical Fruits (Cocoanut, Sapodilla, Mango, Banana). Semi-Tropical Fruits (Kaki). Future Work. *H. E. Van Deman.*
- (1890 report.) The Fruit Crop. Trips of Investigation. Distribution of Seeds, Plants and Scions of Fruits. Nut Culture (Pecan, Chestnut, Almond, Propagation). Native Fruits (Apple, Strawberry, Grape). Tropical Fruits (Pineapple). Semi-Tropical Fruits (Kaki, Goumi). *H. E. Van Deman.*

B. Division of Vegetable Pathology.

Bulletin 11. Report on the Experiments made in 1889 in the Treatment of the Fungous Diseases of Plants. [Devoted largely

UNITED STATES, continued.

- to experiments in treatment of apple scab and grape diseases.] *B. T. Galloway*.
- (1889 report.) Treatment of Grape Diseases. Treatment of the Diseases of the Apple, Pear and Quince (Apple Scab, Bitter Rot of the Apple, Apple Rust, Apple Powdery Mildew, Pear Leaf-Blight, Quince Diseases). Treatment of the Blackberry Rust and other Diseases at Ocean Springs, Miss. Treatment of the Potato, Tomato, and Melon for Blight and Rot. Strawberry Leaf-Blight. Investigation of Peach Yellows. The California Vine Disease. A Mignonette Disease. *B. T. Galloway*.
- (1890 report.) Experiments near Washington (Treatment of Black Rot of the Grape; Treatment of Pear, Cherry and Strawberry Leaf-Blight as affecting Nursery Stock. Treatment of Pear Leaf-Blight and Scab in the Orchard). Coöperative Experiments (Experiments in the Treatment of Apple Scab, Raspberry Leaf-Blight; Experiments in the Treatment of Potato Rot). Some Practical Results of the Treatment of Plant Diseases. Fungicides and Spraying Apparatus. Peach Yellows Investigation. The California Vine Disease. Hollyhock Anthracnose. Anthracnose of Cotton. Ripe Rot of Grapes and Apples. *B. T. Galloway*.
- C. *Division of Gardens and Grounds*.
- (1889 report.) Grape Mildew. Well-ripened Wood. Watering Plants in Pots. Citron, *Citrus Medica*. Horticulture in the Department (Objects and Aims of the Experimental Garden, Grapes, Pear Trees, Peaches, Japan Persimmons, Cinchones, Chinese Tea-plant, Coffee, Orange, Lemon and other Citrus fruits, Apples, Olives, Eucalyptus, Figs, Testing the Merits of Species and Varieties of Plants, Laying out the Grounds and Planting the Arboretum, The Conservatory, Pineapples, Building Glass Houses, Hedges, Miscellaneous Plants Propagated and Distributed). *William Saunders*.
- (1890 report.) Descriptive Catalogue of the more Important Economic Plants in the Department Collection [an alphabetical list comprising 431 species]. *William Saunders*.
- D. *Division of Entomology*.
- Bulletin 21. Report of Trip to Australia, Made under Direction of the Entomologist, to Investigate the Natural Enemies of the Fluted Scale. *Albert Roebelen*.
- (1889 report.) The Fluted Scale. The Six-Spotted Mite of the Orange. *C. V. Riley*.
- (1890 report.) The Boll Worm Investigation. Some New Iceryas. Experiments Against the Black Scale (on Oranges and Lemons). The Green-Striped Maple Worm. A New Peach Pest (*Ceratitis capitata*). The Rose Chafer. *C. V. Riley*.
- E. *Division of Ornithology and Mammalogy*.
- (1889 report.) Investigations Concerning the Economic Relations of the Gopher, Hawks and Owls, Crow, Crow Blackbird, Potato-bug Birds, Collection of Bird Stomachs. *C. Hart Merriam*.

UNITED STATES, continued.

(1890 report.) Seed Planting by Birds. Birds which Feed on Mulberries. *C. Hart Merriam.*

F. Division of Microscopy.

(1890 report.) Mushrooms (Edible) of the United States. Mushroom Culture. Artificial Mushroom Spawn. Twelve Poisonous Mushrooms. *Thomas Taylor.*

G. Office of Experiment Stations.

Bulletin 5. Organization Lists of Agricultural Experiment Stations and Agricultural Schools and Colleges. March.

Bulletin 6. List of Botanists of the Agricultural Experiment Stations and Outline of Work in Botany at the Several Stations. May.

VERMONT :

(3rd report.) Report of the Horticulturist (Seed Tests, Cutting Potatoes, Fungicides, Russian Poplars and Willows, Orchards and Small Fruit Plats, A Circular to the Proprietors or Originators of New Fruits, Tests of Vegetables). *C. W. Minott.* Report of the Entomologist, (Insects and Insecticides). *G. H. Perkins.* 1889.

19. Questions Concerning Injurious Insects. April. *G. H. Perkins.*

VIRGINIA :

4. Field Experiments with Tomatoes, Chemical Composition of Tomatoes. Jan. *Wm. B. Alwood and Walker Bowman.*

7. Experiments with Varieties of Strawberries. July. *Wm. B. Alwood.*

WISCONSIN :

(22). Potatoes, tests of Varieties and Experiments in Methods of Planting. Jan. *E. S. Goff.*

23. Prevention of Apple Scab. April. *E. S. Goff.*

§ 7. *SUBJECT INDEX TO EXPERIMENT STATION
HORTICULTURE IN NORTH AMERICA FOR
1890 (INCLUDING PUBLICATIONS OF THE DE-
PARTMENT OF AGRICULTURE).*

Explanation.—Numbers standing alone refer to the number of a bulletin. Those preceded by p. refer to pages of reports.

ALMOND—

U. S. Dept. Agr., 1890, rep. p. 417.

APPLE, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. pp. 93 and 145. Colo. 2nd rep. pp. 23 and 117. La. 3. Mass. Hatch, 1889 rep. pp. 17 and 28. Mich. 59. N. Y. Cornell xix. N. Y. State A Circular, 1890. N. Car. 72. Oregon 4. R. I. 7. Tenn. 5. Texas 7 and 8. U. S. Dept. Agr. 1889 rep. pp. 125, 442; 1890 rep. p. 418. Vt. 3rd rep. p. 121.

APPLE, DISEASES AND INSECTS OF—

Bark-Lice, Ohio, 4. *Bitter-Rot*, U. S. Dept. Agr. 1889 rep. p. 412; 1890 rep. p. 408. *Black-Rot*, Tenn. 2nd. rep. p. 13. *Bucculatrix*, N. Y. Cornell, XXIII. *Curculio*, Ia. 11. *Flat Headed Apple-Tree Borer*, Oregon, 5. *Maggot*, Del. 1889 rep. p. 110. *Plant-Lice*, Nev. 11. *Powdery Mildew*, Ohio 4; U. S. Dept. Agr. 1889 rep. p. 414. *Rust*, U. S. Dept. Agr. 1889 rep. p. 413. *Scab*, Mich. 59. Ohio, 4, U. S. Dept. Agr. 1889 rep. p. 405; 1890 rep. p. 399. Wis. 23; 7th. rep. p. 193. *Tent Caterpillar*, Neb. 14. *Tree Borer*, Del. 1889 rep. p. 110. *Twig Borer*, Del. 1889 rep. p. 100. *Woolly Aphis* or *Woolly Louse*, Oregon, 5. *Worm or Codlin Moth*, Del. VIII; 2nd rep. pp. 110, 122. Mich. 59. Nev. 8. Oregon 5.

APPLE, MISCELLANEOUS—

Analyses, Mass. State, 7th rep. pp. 295, 300. Mo. 10. Analyses of Pomace, Mass. State, 7th rep. pp. 297, 301. Vt. 3rd rep. p. 74.

APRICOT, CULTURE AND VARIETIES—

Ia. 10. Mo. 10. N. Y. State, Circular, 1890. R. I. 7. Tenn. 5. Texas 8.

ARTICHOKE, CULTURE AND VARIETIES—

Vt. 3rd. rep. p. 100.

ASPARAGUS, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. p. 96. Ohio 9. Vt. 3rd rep. pp. 100, 115.

ASPARAGUS, DISEASES AND INSECTS OF—

Beetle, Del. 2nd rep. pp. 110, 113, 128.

ASPARAGUS, MISCELLANEOUS—

Analyses, Mass. State. 7th rep. p. 306.

BANANA—

U. S. Dept. Agr. 1889 rep. p. 448.

BEAN, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station, 20. Colo. 2nd rep. pp. 35, 100, 120. Kans. 2nd rep. pp. 133, 135. Md. 2nd rep. p. 60. Minn. 11. Nebr. 12. N. Y. Cornell 25. Oregon 4. Pa. 10. Vt. 3rd rep. pp. 100, 115, 125.

BEAN, DISEASES AND INSECTS OF—

Anthracnose, Tenn. 2nd rep. p. 13. *Leaf-Beetle*, Kans. 2nd rep. p. 210. *Plant-Bugs* Kans. 2nd rep. p. 212. *Root-rot of Vine*, Tenn. 2nd rep. p. 13. *Weevil*, Kans. 2nd rep. p. 206.

BEE, CULTURE AND VARIETIES—

Colo. 2nd rep. p. 99. Mich. 57. Nebr. 12. Oregon 4. Vt. 3rd rep. pp. 100, 115, 129.

BLACKBERRY, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. pp. 95, 147. Del. 2nd rep. p. 103. Ind. 31, 33 vol. II. La. 3. Mass. Hatch, 7 and 10; 1889 rep. pp. 40, 45. Mich. 59. Mo. 10. N. Y. State, Circular, 1890. N. C. 72, 74. Oregon 4. Texas 8. Vt. 3rd rep. p. 122.

BLACKBERRY, DISEASES AND INSECTS OF—

Cane-Borer, N. Y. Cornell 23. *Rust*, U. S. Dept. Agr. 1889 rep. p. 416.

BLACK-KNOT—

Can. Exp. Farm, 1889, rep. p. 87. Can. Agr. Coll. LII. Mich. 59. Minn. 2nd rep. p. 13. Penn. 13.

BORAGE—

Vt. 3rd rep. pp. 101, 115.

BROCCOLI—

Vt. 3rd rep. pp. 101, 115.

BRUSSELS SPROUTS—

Vt. 3rd rep. pp. 101, 115.

CABBAGE, CULTURE AND VARIETIES—

Colo. 2nd rep. p. 41. Md. 2nd rep. p. 60. Mass. Hatch, 1889 rep. p. 44. Mich. 57. Minn. 10. N. C. 74. N. Y. Cornell 25. Oregon 4. Pa. 10. Vt. 3rd rep. pp. 101, 115.

CABBAGE, DISEASES AND INSECTS OF—

Aphis, Del. 2nd rep. p. 110. N. J. 72. *Bug*, Del. 2nd rep. p. 130. Tenn. 2nd rep. p. 14. *Butterfly*, S. C. 2nd rep. p. 97. *European Butterfly* and *Southern Butterfly*, Tenn. 2nd rep. p. 14. *White Butterfly*, Del. 2nd rep. p. 123. *Worm*, Del. 2nd rep. pp. 110, 124, 135.

CANKER-WORM—

Del. 2nd rep. p. 110. Vt. 3rd rep. p. 152.

CARNATION—

Mass. Hatch, 10 (fertilizers for).

A. H.—17

CARROT, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. pp. 34, 141. Colo. 2nd rep. pp. 41, 99.
Md. 2nd rep. p. 60. Mass. State, 7th rep. pp. 170, 171. Nebr.
12. Oregon 4. Vt. 3rd rep. pp. 102, 115, 129.

CARROTS, MISCELLANEOUS—

Analyses, Mass. State, 7th rep. pp. 34, 181, 182, 295, 300.

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Texas 8.

CAULIFLOWER, CULTURE AND VARIETIES—

Mich. 57. Minn. 12. Oregon 4. Pa. 10. Vt. 3rd rep. pp. 103, 115.

CELERY, CULTURE AND VARIETIES—

Colo. 2nd rep. p. 38. Oregon 4. Pa. 10. Vt. 3rd rep. pp. 103, 115,
130.

CELERY, DISEASES AND INSECTS OF—

Plant-Louse, Ohio, 2.

CHERRY, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. p. 93. Ia. 10. La. 3. Mass. Hatch, 1889
rep. p. 32. Mich. 59. Mo. 10. Nebr. 12. N. Y. State, Circular
1890. N. C. 72. R. I. 7. Tenn. 5. Texas 8. Vt. 3rd rep.
p. 121.

CHERRY, DISEASES AND INSECTS OF—

Black-Knot, Tenn. 2nd rep. p. 13. *Leaf-Blight*, U. S. Dept. Agr. 1890
rep. 396. *Powdery Mildew*, Ohio 4. *Scollop-Shell Moth*, N. Y.
Cornell 23. *Slug*, Nev. 10. *Tree Tortrix*, N. Y. Cornell 23.

CHERVIL—

Vt. 3rd rep. pp. 104, 115.

CHESTNUT—

U. S. Dept. Agr. 1889 rep. p. 439; 1890 rep. p. 416.

CHICORY—

Vt. 3rd rep. pp. 104, 115.

CITRON—

U. S. Dept. Agr. 1889 rep. pp. 116, 439.

COCOA-NUT—

U. S. Dept. Agr. 1889 rep. p. 447.

CONIFERÆ—

Texas 8.

CORN, SWEET—

Colo. 2nd rep. pp. 32, 102, 121. Ga. 10. Ind. 31. Mass. Hatch, 7.
Mich. 57. Nebr. 12. N. C. 74. Oregon 4. Pa. 10. Vt. 3rd
rep. p. 135. Wis. 17.

CORN, DISEASES AND INSECTS OF—

Aphis and *Bud Worm*, Del. 2nd rep. p. 111. *Curculio*, Del. 2nd rep.
p. 129. *Worm*, Del. 2nd rep. p. 132.

CRANBERRY—

Analyses, Mass. State, 7th. rep p. 302.

CRANBERRY, DISEASES AND INSECTS OF—

Black-headed Cranberry Worm, Fruit Worm, Cranberry Scale, Tip Worm, Yellow-headed Cranberry Worm, N. J. Special Bulletin K.

CRESS—

Vt. 3rd rep. pp. 104, 115.

CUCUMBER, CULTURE AND VARIETIES—

Colo. 2nd rep. pp. 100, 121. La. 3. Nebr. 12. Oregon 4, Vt. 3rd rep. pp. 104, 115, 137.

CUCUMBER, DISEASES AND INSECTS OF—

Nematode, Mass. State, 7th rep. p. 229. *Striped Cucumber Beetle*, Del. 2nd rep. p. 117. Ohio 8.

CURRENT, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. p. 94. Colo. 2nd rep. p. 30. Ind. 31, 33 vol. II. Mich. 59. N. Y. State, Circular 1890. N. C. 72. Oregon 4. R. I. 7. U. S. Dept. Agr. 1889 rep. p. 441. Vt. 3rd rep. p. 112, 122.

CURRENT, DISEASES AND INSECTS OF—

Borer, Ia. 11. Oregon 4. *Leaf Roller*, N. Y. Cornell 23. *Roller and Worm*, Del. 2nd rep. p. 111. *Worm*, Mass. Hatch, 1889 rep. p. 25.

CURRENT, MISCELLANEOUS—

Analyses, Mass. State, 1889 rep. p. 306.

CUT-WORM—

Can. Exp. Farm, 1889 rep. p. 70. Del. 2nd rep. p. 111. Fla. 9. Oregon 5. S. Dakota 18.

DANDELION—

Vt. 3rd rep. p. 114.

DATE—

U. S. Dept. Agr. 1889 rep. p. 438.

DEWBERRY—

Mo. 10. N. Y. State, Circular 1890. R. I. 7. Vt. 3rd rep. pp. 105, 115.

EGG-PLANT—

Vt. 3rd. rep pp. 104, 115.

ELM, DISEASES AND INSECTS OF—

Borer, Vt. 3rd rep. p. 154. *Canker-Worm*, Vt. 3rd rep. p. 152. *Cockscomb Gall Louse*, Vt. 3rd rep. p. 162. *Fall Web Worm*, Vt. 3rd rep. p. 153. *Gall Louse*, Vt. 3rd rep. p. 160. *Leaf Beetle*, Vt. 3rd rep. p. 155. *May Beetle*, Vt. 3rd rep. p. 156. *Mourning Cloak Butterfly*, Vt. 3rd rep. p. 150. *Plant Lice*, Vt. 3rd rep. p. 157. *Tussock Moth*, Vt. 3rd rep. p. 150.

ENDIVE—

Vt. 3rd rep. pp. 105, 115.

FIG—

La. 3. N. C. 72, 74. Tenn. 5. Texas 8. U. S. Dept. Agr. 1889 rep. pp. 127, 436.

FIG, DISEASES AND INSECTS OF—

S. C. 2nd rep. p. 105.

FUNGI—

Conn. 97. Del. 2nd rep. p. 69. Ky. 31. Mass. Hatch 7. Mass. State, 1889 rep. pp. 195, 214. Mich. 59. Nebr. 11. N. J. 70, 76. Ohio 4, 10. Texas 7. 9.

FUNGICIDES—

Conn. 102. Del. X. Kans. 12. Ky. Circular No. 3. Ky. 31. Mass. Hatch 7, 11; 1889 rep. p. 49. U. S. Dept. Agr. 1890 rep. p. 401. Wis. 7th rep. p. 199.

GOOSEBERRY, CULTURE AND VARIETIES—

Colo. 2nd rep. p. 30. Del. 2nd rep. p. 103. Mich. 59. N. Y. State, Circular 1890. N. C. 72. Ind. 31, 33 vol. II. Oregon 4. R. I. 7. Vt. 3rd rep. pp. 112, 122.

GOOSEBERRY, DISEASES AND INSECTS OF—

Fruit Worm, Oregon, 5. *Saw-Fly*, Del. 2nd rep. p. 125.

GOURMI—

U. S. Dept. Agr. 1890 rep. p. 423.

GRAFTING—

Herbaceous, N. Y. Cornell 25.

GRAPE, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station 10. Can. Exp. Farm, 1889 rep. p. 94. Colo. 2nd rep. pp. 24, 119. Ind. 33. Kan. 14. Mass. Hatch, 7; 1889 rep. pp. 18, 33. Mich. 59. Minn. 10. Mo. 10. N. Y. Cornell 19. N. Y. State, Circular 1890. N. C. 72, 74. Oregon 4. R. I. 7; 2nd rep. p. 110. Texas 8. U. S. Dept. Agr. Pom. Div. Bull. 3; 1889 rep. pp. 119, 437, 444; 1890 rep. p. 420. Vt. 3rd rep. p. 122. Wis. 17.

GRAPE, DISEASES AND INSECTS OF—

Anthraxnose, Texas 8. *Berry Moth*, Del. 2nd rep. p. 130. *Black-Knot*, Can. Exp. Farm, 1889 rep. p. 87. *Black-rot*, Del. 2nd rep. p. 111. Texas 8. Tenn. 2nd rep. p. 13. U. S. Dept. Agr. 1889 rep. p. 399; 1899 rep. p. 394. *Brown-rot*, Ohio 10. Tenn. 2nd rep. p. 13. *Brown and Grey Rot*, Texas 8. *Downy Mildew*, Mass. State, 1889 rep. p. 206. Ohio 10. Texas 8. U. S. Dept. Agr. 1889 rep. pp. 111, 399. *Leaf Blight*, Tenn. 2nd rep. p. 13. Texas 8. *Leaf Hopper*, Mass. Hatch, 1889 rep. p. 21. *Leaf Spot Disease*, Texas 8. *Powdery Mildew*, Mass. State, 1889 rep. pp. 29, 30, 50, 312. Tenn. 2nd rep. p. 13. Texas 8. *Procris*, Del. 2nd rep. p. 131. *Rot*, Mo. 10. *Saw-Fly*, Del. 2nd rep. p. 131. *Vine Leaf Borer*, Del. 2nd rep. p. 111.

GRAPE, MISCELLANEOUS—

Analyses, Mass. State, 1889 rep. pp. 303, 304.

GREENHOUSE—

Heating, Mass. Hatch 8. Mich. 63. U. S. Dept. Agr. 1889 rep. p. 130.

GUAVA—

La. 3. Texas 8.

HOLLYHOCK, DISEASES OF—

N. Y. Cornell 25. U. S. Dept. Agr. 1890 rep. p. 407.

INSECTS—

Colo. 2nd rep. pp. 44, 126. Fla. 9. Neb. 14. Ohio 1 vol. II. and 4. Ohio 4 and 1 vol. II. Vt. 19. U. S. Dept. Agr. Div. of Ent. *Green Aphis*, Fla. 9. Oregon 5.

INSECTICIDES—

Ala. Agr. Exp. Station 16 and 17. Ark. 14 and 15. Colo. 2nd rep. p. 44. Del. VIII; 2nd rep. pp. 79, 106, 133. Fa. 9. Ia. 10 and 11. Ky. Circular No. 3. Mass. Hatch 7, 11; 1889 rep. pp. 26, 49. Mass. State, 1889 rep. p. 278. Mich. 58 and 59. Mo. 10. Nebr. 14. N. Y. Cornell 18. Ohio 4. Oregon 5. Tenn. 2nd rep. p. 14. Vt. 3rd rep. p. 145.

JUNEBERRY—

R. I. 7.

KALE—

Vt. 3rd rep. pp. 105, 115.

KOHL-RABI—

Vt. 3rd rep. pp. 105, 115.

LEEK—

Vt. 3rd rep. pp. 105, 115.

LETTUCE, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. p. 95. Colo. 2nd rep. p. 99. La. 3. Md. 2nd rep. p. 60. Mass. Hatch 7 and 10. Mich. 57. Nebr. 15. Oregon 4. Pa. 10. Vt. 3rd rep. pp. 105, 115.

MANGO—

U. S. Dept. Agr. 1889 rep. p. 448.

MAPLE—

Green-striped Worm, U. S. Dept. Agr. 1890 rep. p. 253.

MELON, MUSK—

Ala. Agr. Exp. Station 20. Colo. 2nd rep. pp. 101, 121. La. 3. Nebr. 12. Vt. 3rd rep. pp. 106, 115.

MELON, WATER—

Ala. Agr. Exp. Station 20. Colo. 2nd rep. pp. 101, 121. La. 3. Nebr. 12. Vt. 3rd rep. pp. 106, 115. *Diseases*, U. S. Dept. Agr. 1889 rep. p. 418.

MIGNONETTE—

Disease of, U. S. Dept. Agr. 1889 rep. p. 429.

MULBERRY—

Birds attacking, U. S. Dept. Agr. 1890 rep. p. 285.

MUSHROOM—

U. S. Dept. Agr. 1890 rep. p. 366.

NECTARINE—

Mo. 10. Oregon 4. R. I. 7. N. Y. State, Circular 1890. Tenn. 5

NUTS—

Colo. 2nd rep. p. 123. N. C. 72. Oregon 4. R. I. 7. U. S. Dept. Agr. 1890 rep. p. 415.

OLIVE—

Cal. 85. U. S. Dept. Agr. 1889 rep. p. 126.

OAK CATERPILLAR—

Minn. 10.

ONION, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station 20. Colo. 2nd rep. pp. 40, 98. La. 3. Minn. 10. Nebr. 12. Ohio 9. Vt. 3rd rep. pp. 107, 115.

ORANGE—

La. 3. Texas 8. U. S. Dept. Agr. 1889 rep. p. 123.

ORANGE, DISEASES AND INSECTS OF—

Scale Insects, Fla. 9. U. S. Dept. Agr. Ent. Div. Bull. 21; 1889 rep. pp. 334, 340, 355; 1890 rep. pp. 250, 251.

PANSIES—

Mass. Hatch, 10.

PARSLEY—

Vt. 3rd rep. p. 107.

PARSNIP—

Nebr. 12. Oregon 4. Vt. 3rd rep. p. 107.

PEA, CULTURE AND VARIETIES—

Ala. Canabr. 7. Can. Exp. Farm, 1889 rep. p. 35. Colo. 2nd rep. pp. 33, 97, 120. Ind. 31. Kans. 2nd rep. p. 151. La. 3. Md. 2nd rep. p. 61. Mass. Hatch, 1889 rep. p. 44. Mich. 57. Minn. 11. Nebr. 12 and 15. N. C. 74. Oregon 4, 7. Pa. 10. Vt. 3rd rep. pp. 108, 115.

PEA, DISEASES AND INSECTS OF—

Weevil, Oregon 5.

PEACH, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station 11. La. 3. Mass. Hatch, 1889 rep. p. 31. Mich. 59. Mo. 10. N. Y. State, Circular 1890. N. C. 72. Oregon 4. R. I. 7. Tenn. 5. Texas 8. U. S. Dept. Agr. 1889 rep. pp. 120, 436.

PEACH, DISEASES AND INSECTS OF—

Black Peach Aphis, N. J. 72. *Borer*, Ala. Agr. Exp. Station 11. Del. 2nd rep. p. 111. *Leaf Curl*, Tenn. 2nd rep. p. 13. *Maggot*, U. S. Dept. Agr. 1890 rep. p. 225. *Tree Aphis*, Del. 2nd rep. p. 111. *Tree Borer*, Oregon 5. *Yellows*, Del. 2nd rep. p. 92. N. Y. Cornell 19. 25. U. S. Dept. Agr. 1889 rep. p. 421; 1890 rep. p. 404.

PEAR, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. pp. 93, 146. Colo. 2nd rep. pp. 23, 117. Kans. 14. La. 3. Mass. Hatch, 1889 rep. p. 31. Mich. 59. Mo. 10. N. Y. Cornell 19. N. Y. State, Circular 1890. N. C. 72. Oregon 4. R. I. 7. Tenn. 5. Texas 7, 8 and 9. U. S. Dept. Agr. 1889 rep. pp. 120, 444. Vt. 3rd rep. pp. 112, 121.

PEAR, DISEASES AND INSECTS OF—

Bark Lice, Ohio 4. *Blight Beetle*, Del. 2nd rep. p. 111. *Leaf Blight*, Ohio 4. U. S. Dept. Agr. 1889 rep. p. 415; 1890 rep. p. 396. *Leaf Blister*, N. Y. Cornell 18. *Scab*, Del. VIII; 2nd rep. p. 88. *Slug*, Del. 2nd rep. p. 111. Nev. 10. *Stag Beetle Borer*, N. Y. Cornell 18. *Tree Slug*, Oregon 5.

PECAN—

U. S. Dept. Agr. 1890 rep. p. 415.

PEPPER—

Colo. 2nd rep. pp. 102, 120. Md. 2nd rep. p. 62. Vt. 3rd rep. pp. 108, 115.

PERSIMMON, JAPANESE, OR KAKI—

La. 3. Oregon 4. U. S. Dept. Agr. 1889 rep. pp. 121, 436, 449; 1890 rep. p. 422.

PINEAPPLE—

U. S. Dept. Agr. 1889 rep. p. 130; 1890 rep. p. 421.

PLUM, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station 11. Can. Exp. Farm, 1889 rep. pp. 93, 146. Colo. 2nd rep. p. 117. Ia. 10. La. 3. Mass. Hatch, 1889 rep. p. 32. Mich. 59. Minn. 10. Mo. 11. N. Y. Cornell 18. N. Y. State, Circular 1890. N. C. 72. Oregon 4. R. I. 7. Tenn. 5. Texas 8. U. S. Dept. Agr. 1889 rep. p. 440. Vt. 3rd rep. p. 122.

PLUM, DISEASES AND INSECTS OF—

Black-Knot, Can. Agr. Coll. LII. Penn. 13. Tenn. 2nd rep. p. 13. *Curculio*, Del. 2nd rep. pp. 111, 120. Ind. 33. Ia. 9. Mich. 59. Minn. 10. Ohio, 8. Tenn. 2nd rep. p. 14. *Gouger*, Ia. 9. *Fruit Rot*, Ohio 4.

POPLARS—

Can. Exp. Farm, 1889 rep. p. 145. Minn. 9.

POPLAR, DISEASES AND INSECTS OF—

Borer, Minn. 9. *Girdler*, Minn. 7. *Leaf Gall Louse*, Del. 2nd rep. p. 128.

POT, FLOWER—

The Paper, N. Y. Cornell 25.

POTATO, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. pp. 36, 141. Colo. 2nd rep. pp. 31, 104. Ga. 8. Ind. 31. Kans. 2nd rep. pp. 168, 195. La. 4. Mass. Hatch, 7. Md. 2nd rep. p. 51. Mich. 59 and 60. Minn. 10. Mo. 10. Nebr. 12. N. C. 74. N. Y. Cornell 25. Ohio 1. Oregon 4. Pa. 10. R. I. 2nd rep. p. 111. Tenn. 1; 2nd rep. p. 8. U. S. Dept. Agr. 75 and 76. Vt. 3rd rep. p. 143. Wis. 17 and 22. Wis. 7th rep. p. 205.

POTATO, DISEASES AND INSECTS OF—

Blight, Ohio 4 and 8. *Bug-eating Birds*, U. S. Dept. Agr. 1889 rep. p. 369. *Colorado Beetle*, Del. 2nd rep. p. 118. La. 4. *Rot*, La. 4. U. S. Dept. Agr. 1889 rep. p. 417; 1890 rep. p. 400. Mass. Hatch, 11. *Scab*, Conn. 105. La. 4. Mass. State, 34. *Sphinx*, Ga. 6. *Stalk-Weevil*, Ia. 11.

PRESERVATIVE FLUIDS FOR FRESH FRUITS—

Cal. 86.

PRUNE—

Ia. 11.

PUMPKIN—

Colo. 2nd rep. pp. 41, 102, 222. Md. 2nd rep. p. 62. Nebr. 12. N. Y. Cornell 25. Vt. 3rd rep. pp. 108, 115.

QUINCE—

La. 3. N. Y. Cornell 19. N. Y. State, Circular, 1890. N. C. 72. Texas 8. U. S. Dept. Agr. 1889 rep. p. 416. Vt. 3rd rep. pp. 112, 122.

RADISH—

Can. Exp. Farm, 1889 rep. p. 95. Colo. 2nd rep. p. 99. La. 3. Md. 2nd rep. p. 62. Nebr. 12 and 15. Oregon 4. Penna. 10. Vt. 3rd rep. pp. 108, 115.

RASPBERRY, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station 20. Can. Exp. Farm, 1889 rep. pp. 94, 120, 131, 147. Del. 2nd rep. p. 103. Ind. 31, 33 Vol. II. Mass. Hatch, 7 and 10; 1889 rep. p. 38. Mo. 10. N. Y. State, Circular 1889. N. C. 72, 74. Ohio 7. R. I. 7. Texas 8. Vt. 3rd rep. p. 123.

RASPBERRY, DISEASES AND INSECTS OF—

Leaf-Blight, U. S. Dept. Agr. 1890 rep. p. 399.

RHUBARB—

Can. Exp. Farm, 1889 rep. p. 96.

RHUBARB, DISEASES AND INSECTS OF—

Curculio, Ohio 8.

ROSE, DISEASES AND INSECTS OF—

Beetle, Can. Exp. Farm, 1889 rep. p. 88. Del. 2nd rep. p. 111. Nev. 9. *Slug*, Del. 2nd rep. pp. 111, 115.

SALSIFY—

Nebr. 12.

SAPODILLA—

U. S. Dept. Agr. 1889 rep. p. 447.

SEEDS, GERMINATION AND TESTING OF—

Can. Exp. Farm, 1889 rep. p. 17. Del. 2nd rep. pp. 37, 46. Vt. 3rd rep. pp. 99, 118. Wis. 7th rep. p. 126.

SEEDS AND PLANTS, DISTRIBUTION OF—

Cal. 81 and 84. U. S. Dept. Agr. 1889 rep. p. 132; 1890 rep. p. 413.

SPINACH—

Vt. 3rd rep. pp. 108, 115.

SPINACH, DISEASES AND INSECTS OF—

Anthraxnose, Black Mould, Leaf Blight, Mildew and White Smut, N. J. 70.

SQUASH, CULTURE AND VARIETIES—

Colo. 2nd rep. pp. 42, 102. La. 3. Md. 2nd rep. p. 62. N. Y. Cornell 25. Vt. 3rd rep. pp. 109, 115, 138.

STRAWBERRY, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station 20. Ark. 13. Can. Exp. Farm, 1889 rep. pp. 95, 120, 130, 148. Colo. 2nd rep. p. 27. Del. 2nd rep. p. 103. Ind. 31, 33 Vol. II. Ky. 25. La. 3. Md. 9. Mass. Hatch, 10; 1889 rep. p. 91. Mich. 59. Mo. 10. N. Y. State, 24 and Circular 1890. N. C. 72, 74. Ohio 7. Oregon 7. R. I. 7; 2nd rep. p. 111. Texas 8. U. S. Dept. Agr. 1890 rep. p. 418. Vt. 3rd rep. pp. 112, 123. Vir. 7. Wis. 7th rep. p. 213.

STRAWBERRY, DISEASES AND INSECTS OF—

Beetle, Fla. 9. *Blight*, N. Y. State 24. *Crown Borer*, Ind. 33 Vol. 2. Ky. 31. *False Worm*, Ky. 31. *Grub*, Del. 2nd rep. p. 111. Ky. 31. *June Bug*, Ky. 31. *Leaf-Blight Fungus*, Ky. 31. U. S. Dept. Agr. 1889 rep. p. 419; 1890 rep. p. 396. *Leaf Roller*, Ky. 31. *Root Worm*, Ky. 31. *Smear'd Dagger*, Ky. 31. *Tarnished Plant Bug*, Ky. 31.

SWEET POTATO—

Nebr. 12. N. C. 74. Texas 7.

SWEET POTATO, DISEASES AND INSECTS OF—

Black Rot, Dry Rot, Leaf Blight, Leaf Mould, Soft Rot, Scurf, Soil Rot, Stem Rot, White Rot, N. J. 76.

TOMATO, CULTURE AND VARIETIES—

Ala. Agr. Exp. Station 20. Can. Exp. Farm 1889 rep. p. 117. Colo. 2nd rep. pp. 41, 104. Ind. 31. Kans. 2nd rep. p. 198. La. 3. Md. 2nd rep. pp. 43, 67, 74. Mass. Hatch, 10. Mich. 57. N. Y. Cornell 21. N. C. 74. Oregon 4, 7. Tenn. 10. Vt. 3rd rep. pp. 109, 115, 138. Vir. 4.

TOMATO, DISEASES AND INSECTS OF—

Rot, U. S. Dept. Agr. 1889 rep. p. 418. *Worm*, Del. 2nd rep. pp. 111
126.

TURNIP, CULTURE AND VARIETIES—

Can. Exp. Farm, 1889 rep. pp. 33, 117. Colo. 2nd rep. p. 103. Nebr.
12. Oregon 4. Vt. 3rd rep. pp. 110, 115, 142.

TURNIP, DISEASES AND INSECTS OF—

Flea Beetle, Can. Exp. Farm, 1889 rep. p. 72.

WILLOW—

Minn. 9. N. C. 72

WILLOW, DISEASES AND INSECTS OF—

Flea Beetle, Nebr. 4. *Grove Plant Louse*, Ohio 2. *Saw-Fly*, Minn. 9.
Nebr. 14. *Slug*, Minn. 9. *Spotted Plant Louse*, Ohio 2. *Spotted
Willow Slug*, Nebr. 14.

WINES, CONSERVATION OF—

Cal. 87.

§ 8. *BOOKS OF 1890, EXCLUSIVE OF REPORTS OF
HORTICULTURAL ORGANIZATIONS.*

This list contains some of the books of 1889 which did not appear in the list for that year (ANNALS 1889, 213). The titles of books in foreign languages are given in English.

- Andrae, E. A. A Guide to the Cultivation of the Grape Vine in Texas, and Instructions for Wine Making. Dallas, Texas.
 Bailey, L. H. Annals of Horticulture for 1889. New York.
 — Horticulturist's Rule-Book. New York.
 Barral & Sagnier. Dictionary of Agriculture, No. 23. Paris.
 Bellair, G. Ad. Fruit Trees. Paris.
 Bergmann, Ernest. An Excursion in Portugal. Meaux.
 Birmingham Gardeners' Association. A Series of Papers read before the Association in 1886 and 1887.
 Bois, D. The Little Garden. Paris.
 Bonavia, E. The Cultivated Oranges and Lemons, etc., of India and Ceylon. 2 vols. London.
 Bon Jardinier for 1890. 134th ed. Paris.
 Bosschere, Charles de. Horticulture at the Paris Exposition. Ghent.
 Bouché, C. & J. Construction and Arrangement of Greenhouses. Bonn.
 Brooks, C. Mushrooms and their Culture. London.
 Bunyard, Frederick. Fruit Farming for Profit. Maidstone, Eng.
 Carter. Carter's Practical Gardener. London.
 Dame, Lorin, and Brooks, Henry. Typical Elms and Other Trees of Massachusetts. Embellished 4to. Boston.
 Daul, A. Cacti. Stuttgart.
 Dilling, Gustav. Heinrich Gustav Reichenbach: a Sketch of His Life. Hamburg.
 Earl of Meath. On the Public Parks of America. London.
 Eisen, Gustav. The Raisin Industry. A Practical Treatise on the Raisin Grapes, their History, Culture and Curing. San Francisco.
 E. V. B. Days and Hours in a Garden. 7th ed. London.
 Ferns, Book of Choice, for the Garden, Conservatory and Stove. London. In monthly parts.
 Fleischer, Dr. C. The Most Important Enemies of Fruit Trees, and Methods for their Destruction. Dresden.
 Garola, C. G. The Use of Fertilizers. Amiens.
 German Agricultural Society. The Stone Fruits of Germany. Berlin.
 Goethe, R. Report of the Royal School for Fruit Culture at Geisenheim. Wiesbaden.
 Greiner, T. How to make the Garden Pay. Philadelphia.
 Griffith, A. B. Diseases of Crops and their Remedies. London.

- Halsted, Byron D. Reserve Food—Materials in Buds and Surrounding Parts. Mem. Torr. Bot. Club, vol. ii. No. 1. New York.
- Harris, Jos. Nitrate of Soda for Manure, and the Best Mode of its Employment. Rochester, N. Y.
- Hartig, Dr. Robert. Timbers and How to Know Them. Translated by William Sommerville. Edinburgh.
- Hartwig, J., and Heinemann, F. C. The Clematis. Leipzig.
- Heinemann, F. E. Aquarium, In-Door Garden and Conservatory. Leipzig.
- The Culture of Common Bulbous Plants. Leipzig.
- Henderson, Alfred. Peter Henderson. A Memoir. New York.
- Hensel, Julius. Explanation of Hensel's Universal Fertilizer. Berlin.
- Hofer, A. N. Grape Growing. McGregor, Iowa.
- Howe, Walter. The Garden, as Considered in Literature by Certain Polite Writers. New York.
- Hubert, Philip G. Jr. Liberty and a Living. New York.
- Jones, Walter. Heating by Hot Water.
- Jühlke, F. Garden Book for Ladies. 4th edition. Berlin.
- Kettlewell, Arthur M. The Art of Landscape Gardening. London.
- Kirchner, Dr. Oskar. The Diseases and Injuries of our Cultivated Plants. Stuttgart.
- Kolb, Max. European and Trans-Oceanic Alpine Plants. Stuttgart.
- Kraetzl, Franz. Sweet Rowan (*Pyrus Aucuparia*, var *dulcis*). Vienna and Olmütz.
- Lebl. Indoor Gardening. Leipzig.
- Mushroom Culture. 3rd edition. Berlin.
- Lepki. Open Letters for Garden, Field and Forest Culture. Prag-Weinberge.
- Lisbonne, Gaston. Legislation on Raisins. Montpellier, France.
- M'Alpine, A. N. How to Know Grasses by their Leaves. Edinburgh.
- Maries, Charles. Mangos of India. London.
- Mark, M. Latest Guide to all Garden Literature. Erfurt.
- Martin, Edward Alfred. Glimpses of Nature's Secrets. London.
- Mathews, F. Schuyler. The Golden Flower [*Chrysanthemum*]. In Colors. Prang & Co. Boston.
- Mayfahrt Ph. & Co. Vegetable and Fruit Culture in the Field, with Reference to Canning and Preserving. Frankfort a. M.
- Meulenaere, O. de. Descriptive List of Winter Chrysanthemums. Ghent.
- Mills & Shaw. The First Principles of Agriculture. Toronto, Canada.
- Milner, H. E. The Art and Practice of Landscape Gardening. London.
- Missouri Botanical Gardens. First Report, by the Director. St. Louis.
- Mönkemeyer, W. Handbook of Botanical Terms for Gardeners. 2nd edition of Kohl's Work. Berlin.
- Morgenthaler, J. Grape, Fruit and Garden Culture at the Paris Exposition, and the International Agricultural Congress from the 4th to 11th of July, 1889. Zurich.
- Morton, James. Southern Floriculture. Clarksville, Tenn.
- Mossdorf, Otto. Studies for Landscape Gardeners. Leipzig.
- Moyen, J. Les Champignons. An Elementary Treatise upon Mycology, with descriptions of useful, dangerous and remarkable species.
- Müller, Ludwig. Guide to Horticultural Literature. Berlin.

- Ohrt, H. *The Parks and Gardens of the Grand Duke, at Oldenburg.* Leipzig.
- Oliver, F. W. *On Sarcodes sanguinea*, Torr. London.
- Ormerod, Miss E. A. *Report on Injurious Insects.* London.
- Parey, Paul. *Novelties of the Past Year.* Berlin.
- *Phylloxera Laws.* Berlin.
- Poole, Mrs. Hester M. *Fruits and How to Use Them.* New York.
- Pratt, Mara L. *The Fairyland of Flowers.* Boston, Mass.
- Ravenscroft, B. C. *Tomato Culture for Amateurs.* London.
- Reeves, J. A. *Sap; Does it Rise from the Roots?*
- Remark, Fred. *The Cactus Friend.* Minden i. W. Germany.
- Report of the Tree Planting and Fountain Society of Brooklyn, N. Y.*
- Rexford, Eben E. *Home Floriculture.* Vick, Rochester, N. Y.
- Ritzema, J. *Injurious and Beneficial Animals.* Berlin.
- Runge, C. *Catalogue of the Fruits Adapted to the Province of Brandenburg.* Berlin.
- Sandmann, J. *Manual of the Markets.* Berlin.
- Schomburg, R. *Report on the Progress and Condition of the Botanic Garden.* Adelaide (South Australia).
- Schwaab, Ernest F. *Secrets of Canning. A Complete Exposition of the Theory and Art of the Canning Industry.* Baltimore.
- Schweizer, *Garden Calendar for 1890.* Zurich
- Scribner, F. Lamson. *Fungus Diseases of the Grape and other Plants and their Treatment.* Little Silver, N. J.
- Seymour, A. B. and Earle, F. S. *Economic Fungi.* (Exsiccatæ).
- Sorgues and Berthault. *Raisins and Their Uses.* Paris.
- Stoll, Dr. R. *On the Apples and Pears of the Vienna Market.* Klosterneuburg.
- Strassheim, C. J. *Desirable Roses.* Frankfort, a. M.
- Sturtevant, E. Lewis. *On Seedless Fruits. Memories of the Torrey Botanical Club, Vol. i. No. 4.*
- Sutton & Sons. *The Art of Preparing Vegetables for the Table.* Reading, England.
- Terry & Root. *How to Grow Strawberries.* Medina, Ohio.
- Thomayer, Fr. *Technical Pomology.* Prague.
- Thompson, W. *Practical Treatise on the Grape Vine.* 10th edition. Edinburgh & London.
- Veitch & Sons, James. *A Manual of Orchidaceous Plants Cultivated under Glass in Great Britain. Part VI. Cœlogyne, Epidendrum, etc.* London.
- Vergara, M. *The Falling of Grapes.* Translation of Charles Baltet's work. Madrid.
- Wait, Frona Eunice. *Wines and Vines of California.* San Francisco.
- Whitehead, Charles. *F. L. S. Hints on Vegetable and Fruit Farming.* London.
- *Injurious Insects and Fungi: 3rd annual Reports.* London.
- Woodward, Miss Florence H. *The Genus Masdevallia.* Issued by the Marques of Lothian, chiefly from plants in his collection. Grantham.
- Wynne, Brian. *Our Hardy Fruits.* London.

§ 9. *HORTICULTURAL PERIODICALS OF THE
WORLD.*

NORTH AMERICA.

This list includes all the periodicals which are strictly horticultural. Many agricultural papers publish horticultural departments, and a few, of which the *Florida Dispatch* and *Northwest Horticulturist*, *Agriculturist* and *Stockman* are examples, give particular attention to horticultural matters.

American Farm and Horticulturist. Lakewood, Ohio. *Quarterly*.
American Florist. Chicago. *Weekly*.
American Garden. New York. *Monthly*.
California Fruit Grower. San Francisco. *W*.
Canadian Horticulturist. Grimsby, Ontario. *M*.
Floral Instructor. Ainsworth, Ia. *M*.
Florists' Exchange. New York. *W*.
Fruit and Grape Grower. Charlottesville, Va. *M*.
Fruit and Vegetable Grower. Cheswold, Del. *M*.
Fruit Growers' Journal. Cobden, Ill. *Semi-monthly*.
Fruit Trade Journal. New York. *W*.
Garden and Forest. New York. *W*.
Green's Fruit Grower. Rochester. *Quart*.
Horticultural Art Journal. Rochester. *M*.
Journal of the Columbus Horticultural Society. Columbus, O. *Quart*.
Lindenia. *M*. (An English edition of the French journal, with a central American office in New York).
Mayflower. Queens, N. Y. *M*.
National Horticulturist. Cambridge, Md. *M*.
Nebraska Horticulturist. Bower, Neb. *M*.
Orchard and Garden. Little Silver, N. J. *M*.
Ornamental and Forest Tree Grower. Evergreen, Wis. *M*.
Park's Floral Magazine. Fannetsburg, Pa. *M*.
Pilot Point Horticulturist. Pilot Point, Texas. *M*.
Popular Gardening. Buffalo. *M*.
Seed Time and Harvest. La Plume, Pa. *M*.
Southern Horticultural Journal. Denison, Texas. *Semi-monthly*.
Vick's Magazine. Rochester. *M*.
Vineyardist. Penn Yan, N. Y. *Semi-monthly*.
Western Garden. Des Moines, Iowa. *M*.

ENGLAND.

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| Amateur Gardening. London. | Garden Horticultural Gazette. Manchester. |
| Botanical Magazine. London. | Gardener. London. |
| Floral Magazine. London. | Gardeners' Chronicle. London. |
| Floral World and Garden Guide. London. | Gardeners' Magazine. London. |
| Florist and Pomologist. London. | Gardening Illustrated. London. |
| Fruit Farm Review. | Gardening World. London. |
| Fruit Trade Journal. London. Discontinued with the year. | Horticultural Record. London. |
| Garden. London. | Horticultural Times. London. |
| Garden Almanac. London. | Journal of Horticulture. London. |
| | Northern Gardener. Manchester. |

IN FRENCH.

- Annales de l' Horticulture. Brussels.
Annuaire Général d' Horticulture. Toulouse.
Art dans l' Horticulture. Paris.
Belgique Horticole (La). Gand (Ghent).
Bulletin d' Arboriculture. Ghent.
Bulletin d' Arboriculture, de Floriculture, et de Culture Potagère. Gand (Ghent).
Bulletin de la Fédération des Sociétés d' Horticulture de Belgique, publié par le Ministère de l' Agriculture. Gand.
Bulletin d' l' Horticulture. Clermont (Oise).
Bulletin de la Société Horticole, Viticole et Forestière de Sens. Auxerre.
Bulletin de la Société d' Horticulture de Bongival. Saint-Germain-en-Laye.
Bulletin du Cercle Floral d' Anvers. Anvers.
Bulletin du Syndicat des Viticulteurs de France. Paris.
Bulletin Horticole (Le). Huy.
Bulletin Mensuel de la Société d' Horticulture Pratique du Rhone. Lyons.
Chasse et Pêche, Acclimation et Élevage. Organ of the Royal Society of St. Hubert. Brussels.
Flore des Serres et Jardins de l' Angleterre. Gand (Ghent).
Horticulteur L'. Mons.
Jardin (Le). Argenteuil.
Jardin de la France. Tours.
Journal d' Agriculture et d' Horticulture. Bordeaux.
Journal de Horticulture Pratique. Paris.
Journal des Orchidées. Brussels.
Journal de la Société Centrale d' Horticulture. Paris.
Journal de Vulgarisation de l' Horticulture. Paris.
Journal des Roses. Paris.
Illustration Horticole, L'. Brussels.
Lindenia, Iconographie des Orchidées. Brussels.
Orchidophile, L'. Argenteuil.
Lyon Horticole. Lyons.
Moniteur d' Horticulture, Arboriculture, Viticulture, Sciences, Arts et Industries Horticoles. Paris.

Progrès Agricole et Viticole. Montpellier.
 Réveil Viticole. Paris.
 Revue Horticole. Paris.
 Revue Horticole, Viticole, et Apicole de la Suisse Romande. Geneva.
 Revue Vinicole. Paris.

IN GERMAN.

Berliner Blätter für Botanik, Gärtnerei und Landwirthschaft. Berlin.
 Deutsche Gärten-Zeitung. Leipzig.
 Deutscher Garten. Berlin.
 Deutscher Garten-Kalendar. Berlin.
 Deutsches Magazin für Garten-und Blumenkunde. Stuttgart.
 Freyhoff's Garten-und Ackerbau-Zeitung. Oranienburg.
 Gärtner. Berlin.
 Garten-und Blumenfreund. Cassel.
 Garten-und Blumenzeitung. Hamburg.
 Gartenflora. Berlin.
 Hamburger Garten-und Blumen-Zeitung. Hamburg.
 Illustrierte Monatshefte für des Gesammt-Interessen des Gartenbaus,
 Munich.
 Illustrierte Garten-Zeitung. Stuttgart.
 Monatsblatt für Gartenbau. Keil.
 Monatsschrift des Gartenbauvereins zu Darmstadt. Darmstadt.
 Monatsschrift für Obst und Weinbau. Frauenfeld.
 Nachrichten aus dem Gebiete des Gartenbaus, der Landwirthschaft, Fish-
 erei und Jagd. Vilshofen and Hacklberg.
 Obstbau. Stuttgart.
 Obstgarten. Klosterneuburg bei Wien (Vienna).
 Obstdeutscher Anzeiger für Gartenbau. Thorn.
 Obstmarkt. Berlin.
 Pomologische Monatshefte. Stuttgart.
 Praktische Obstzüchter. Klosterneuburg bei Wien (Vienna).
 Practische Ratgeber im Obst-und Gartenbau. Frankfurt a. d. O.
 Rheinische Blätter für Obst-Wein-und Gartenbau. Strassburg.
 Rheinische Gartenschrift. Carlsruhe Vereinigte Frauendorfer Blätter.
 Frauendorf.
 Rosen-Zeitung. Frankfort-on-the-Main.
 Wiener Illustrierte Garten-Zeitung. Vienna. (Journal of the Imperial
 Horticultural Society.)
 Zeitschrift für Obst-und Gartenbau. Leipzig.

IN ITALIAN, SPANISH, PORTUGUESE.

Bulletino della Societa Toscana d' Horticultura. Florence.
 Frutta e Vino. Milan.
 Giardini. Milan.
 Gardiniene. Milan.
 Jornal de Horticultura Practica. Oporto.

L' Orticoltura Genovese. Genoa.
O' Floricultor. Oporto.
Revista de Horticultura. Rio de Janiero.
Revista Horticologica. Barcelona.
Revista Orticola. Pallanza.

MISCELLANEOUS.

Dansk Havetidende. Copenhagen.
Gyümölcsészeti és Konyhakertészeti Füzetek. Budapest.
Het Neederlandsche Tuinboublad. Arnhem.
Journal of the Board of Viticulture. Victoria, Australia.
Kertészeti Füzetek. Budapest.
Népkortеше. Budapest.
Sadovodstvo. Moscow.
Sempervirens; Gronewegen. Amsterdam.
Tidning för Trädgordsodlare. Stockholm.

§ 10. TOOLS AND CONVENIENCES OF THE YEAR.

VARIOUS DEVICES FOR FACILITATING HORTICULTURAL LABOR
WHICH HAVE BEEN INVENTED OR HAVE BEEN FIRST PROMI-
NENTLY MENTIONED DURING 1890.*

WEEDER.—(Fig. 1.) This is a purslane weeder, designed to follow a cultivator. It pulls up and collects all the purslane and similar weeds, being narrower at the rear end. The teeth are about 14 inches in length, round iron, $\frac{1}{2}$ or $\frac{3}{8}$ in. in diam-

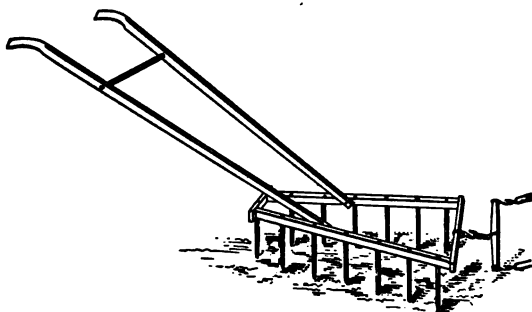


FIG. 1.

eter.—*Eugene Willet, in Popular Gardening, vi. 49.*

HOME-MADE GARDEN HOE.—(Fig. 2.) Made from a blade of an old buck-saw.—*Fred W. Card, in American Garden, 393.*

HOES.—(Fig. 3, page 251.) Various designs by *A. B. Tarryer, in American Garden, 203, 204, 264, 265, 614.*

HOES.—(Fig. 4, page 252.) “Nos. 1 and 2 I use for stirring the soil and for the general purposes of a weed hoe, and Nos. 3 and 4 for more delicate work among close rows of plants.”—*D. S. Marvin, in American Garden, 631.*

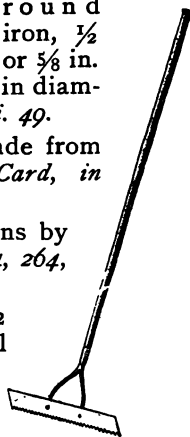


FIG. 2.

* None of the tools mentioned are in any manner recommended by the Editor.

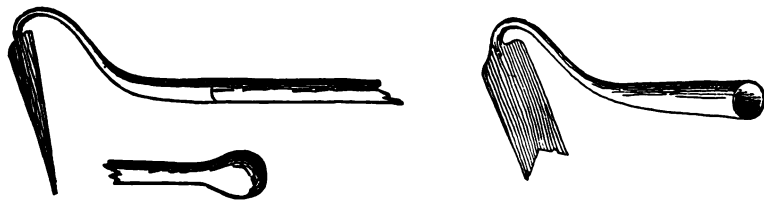


FIG. 3.

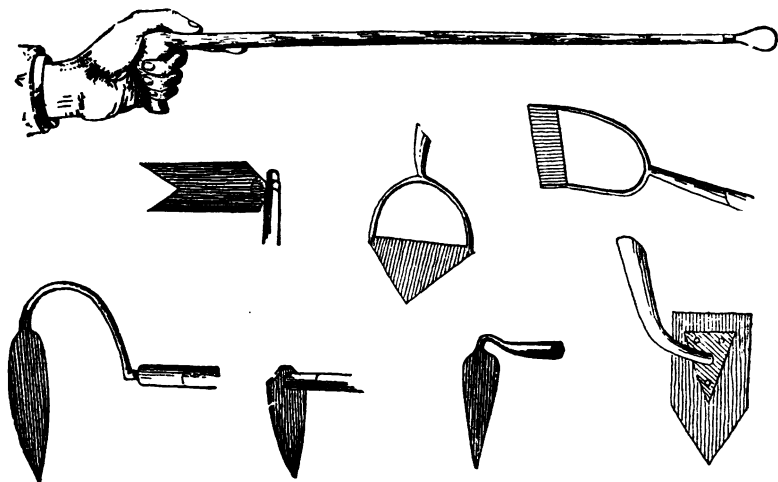


FIG. 3, CONTINUED.

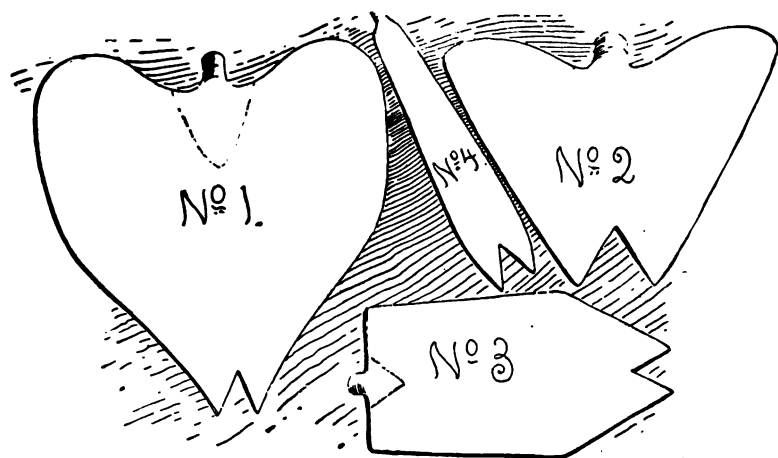


FIG. 4.

CLEARING FORK.—(Fig. 5.) A strong fork for removing cabbage stumps, stones, etc. — *Fred W. Card, in American Garden, 393.*



FIG. 5.

CLOD CRUSHER OR GRATER.—(Fig. 6.) Made from an old stone-boat by driving strong spikes through it in a slanting direction, or threshing machine teeth may be used. Stones and rubbish may be drawn from the field at the same time that the implement works the ground. — *Fred W. Card, in American Garden, 393.*

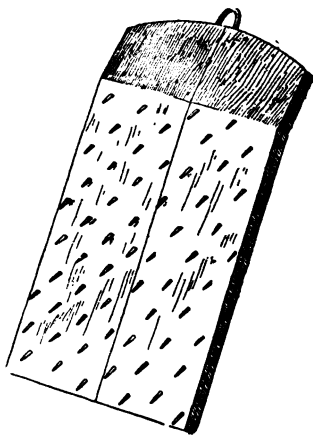


FIG. 6.

HOME-MADE GARDEN MARKER.

—(Figs. 7, 8 and 9.) "For the beam or head (Fig. 7) I use

1½x2 in. stuff 4 ft. 2 in. long, plowing a groove ½x½ in. in the lower side. I then bore ½-in. holes every 2 in., beginning 2 in. from the end. The teeth (Fig. 8) are made of oak, from a stick like the beam, with a tenon 2 in. wide by ½ in. high and ¾ in. long. Two inches below this tenon or shoulder I mortise in a nut to take the joint-bolt, which is inserted through the beam to hold the tooth. This joint-bolt (Fig. 9) is 5 in. long, ¾ in. diameter, and pointed, with a thread turned on the lower end. The hole in which the bolt lies should be ½ in., to allow of

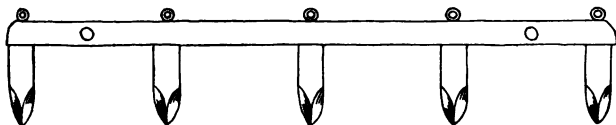
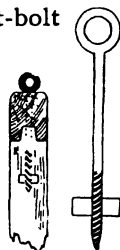


FIG. 7.



FIGS. 8, 9.

easy transference. The lower end of the tooth is sharpened somewhat like a double mould plow. For handles I use two rake handles about 5 ft. long, which are fastened in the head between the bolt holes. The teeth can be adjusted to any distance in a very short time, and the implement is a useful and durable one. The rings on the top of the joint-bolt allow it to be turned with a stick when a wrench is not handy."—*John Jeannin, Jr., in American Garden, 179.*

SEED DROPPER.—(Fig. 10, page 254.) "The part reaching the ground, which is fitted into the bottom of the box, is made of two strips of wood grooved out on one side, and fastened together, forming a tube through which the seed drops.

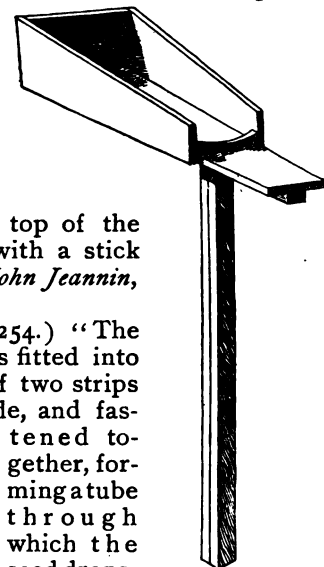


FIG. 10.

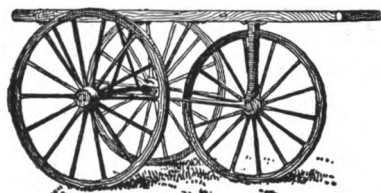


FIG. 11.

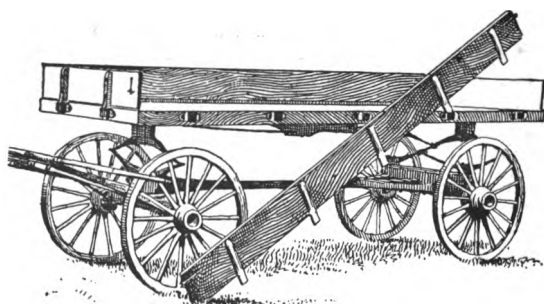


FIG. 12.

Carrying the tool in the hand, the number of seeds that are wanted in the hill is pushed in with the thumb, which remains over the opening, preventing the escape of more seeds till the next hill is reached. The covering of the seeds is usually done readily with the

foot."—*Fred W. Card, in American Garden, 393.*

LIMA BEAN PLANTER.—The bean planters in use are apt to break or split the bean. A machine which appears to have overcome this difficulty has been invented by J. D. Morgan, of Ventura, California. It consists of a cast wheel containing pods or fingers, which grasp the beans as the wheel revolves, each picking up one or two beans, and holding them

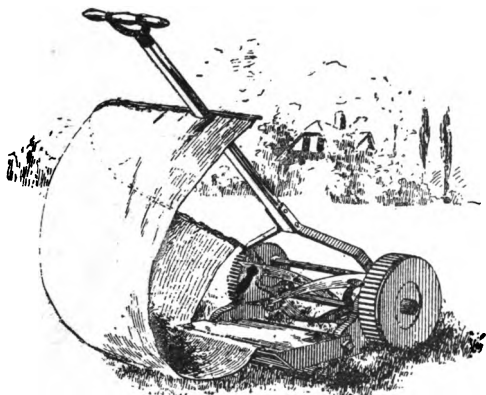


FIG. 13.

firmly until deposited in the mouth of the tube, from which they are conveyed to the ground. The wheel can be so adjusted as to plant the beans at any desired distance apart. The planter is made so that it can be easily adjusted to a sulky cultivator frame. —*California Fruit-Grower, Feb. 8.*

A HANDY CART.—

(Fig. 11, page 254.)

"This is a platform hand-cart, so stable that it can be used in the field as a table, upon which the sorting and weighing of experimental crops is done. We use a 3-ft. wheel and a wide tire. The body is provided with a border an inch high all around."

*L. H. Bailey,
in American
Garden, 88.*

**HANDY
GARDEN
WAGON.**—

(Fig. 12, p. 254.) "This is a combination fruit

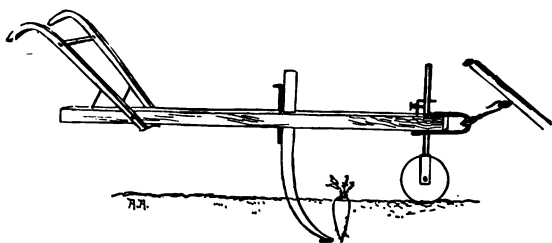


FIG. 14.

and truck wagon. The body projects over the wheels, giving a very large surface for the handling of crates, boxes, barrels, etc. I use a 3-ft. wheel with a 2½-in. tire. The body is 4

ft. 8 in. by 12 ft. It is used either behind a pole or thills. — *L. H. Bailey, in American Garden, 88.*

LAWN MOWER ATTACHMENT.—(Fig. 13, page 255.)—A patented device for catching and holding the grass thrown off by a lawn mower.—*Rural New-Yorker, 745.*

ROOT LIFTER.—(Fig. 14, page 255.)—The beam is of hard wood, 5 feet long and $2\frac{1}{2} \times 3\frac{1}{2}$ in. In front is an inch hole through which the wheel-rod passes. The upper end of the clevis



FIG. 16.



FIG. 15.

is turned up and a threaded hole cut in it to receive the thumb-screw which holds the wheel-rod in place. The iron lifter is inserted in a mortise about mid-way of the beam, and is held in place by a key, which provides means for adjusting it to various depths. The foot is made of $\frac{5}{8}$ -inch iron 3 inches wide, with a small wing of steel riveted to the lower end. The roots are topped with a hoe before being lifted.—*Am. Agriculturist, 315.*

STEP LADDER FOR FRUIT PICKERS.—(Fig. 15, page 256). A self-supporting step ladder with a revolving holder for the basket.—*Canadian Horticulturist*.

FRUIT PICKER.—(Fig. 16, page 256). A blouse fruit-picker, designed for picking choice fruits. The fruit is taken off with scissors; it falls into the sleeve and enters the waist of the blouse. If necessary, the over plus may be conducted into a padded basket.—*Rural New-Yorker*, 663.

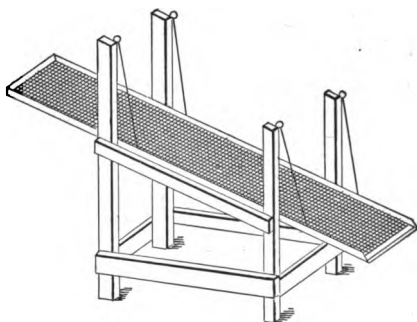


FIG. 17.

BEAN CLEANER.—(Fig. 17.) A swinging sieve for cleaning beans as they are poured into it. The standards should be about 2x3 at the base, and 2x2 at the top. The rack should be about 4½ ft. long, and is hung on strong wires about 20 in.

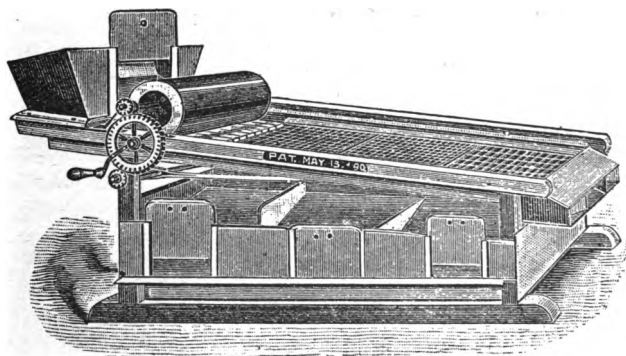


FIG. 18.

long. For beans the size of the Navy, five meshes to the inch will be required; but for larger beans coarser sieves may be used.—*Popular Gardening*, v. 115.

HAMILTON'S FRUIT GRADER.—(Fig. 18.) A new machine

for grading fruit, and said by the inventor to be the only one which is adapted to both green and dried fruit. Made at San José, California.

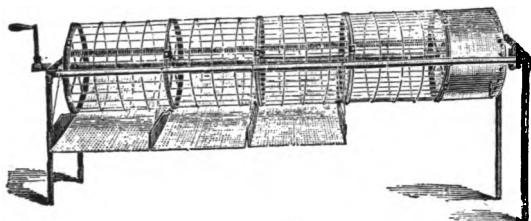


FIG. 19.

FRUIT SORTER (Fig. 19).—A simple device which sorts the fruit by allowing the small specimens to fall through the wire screen as

the cylinder is turned.—*Rural New-Yorker*, 590.

CALIFORNIA FRUIT PITTEER.—(Fig. 20.) A machine completed late in 1889, and put upon the market in California early this year. It cuts and pits the fruits.—*California Fruit Grower*, April 5, 216.

ALMOND HULLER.—(Fig. 21, page 259.) A California machine. "A man, with a boy to feed, will hull two tons of almonds in a day, formerly the work of eight or ten men. It consists of irregular hardwood slats, fastened to an endless belt. Bars underneath it are set on spiral springs, which can be geared to any size of almond. Those nuts that pass through unhulled are picked out and hulled by hand. Very few shells are broken in a day's work."—C. H. S., in *Rural New-Yorker*, 729.

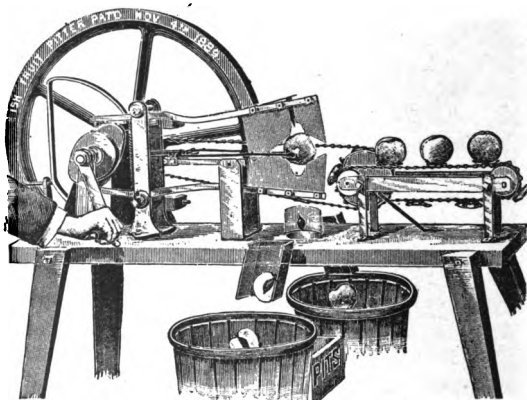


FIG. 20.

POTATO SORTERS.—(Figs. 22-25). Figs. 22 and 23 (page 260) show patented devices, the former being the Hoover and

the latter the Collins. (*Rural New-Yorker*, 485.) A home-made sorter is shown in Figs 24 and 25 (page 261). It comprises one screen cylinder inside another. The inner cylinder is coarse enough to allow the dirt and small potatoes to pass through, while the outer one is finer, and allows only the dirt to pass. The large tubers, therefore, follow the inner cylinder, and the small ones are caught between the two.—W. D., in *Rural New-Yorker*, 607.

CELERY HILLER.—A machine has been invented by Maurice M. Ranney, of Michigan, for hilling celery. The hilling is done by means of mold-boards. "The mold-boards are adjustable to suit

the height of the plants, and laterally to correspond with the width of the rows, the machine being designed to crowd the earth from the bottom of the furrows under the leaves, simultaneously upon both sides of the rows. The side beams of

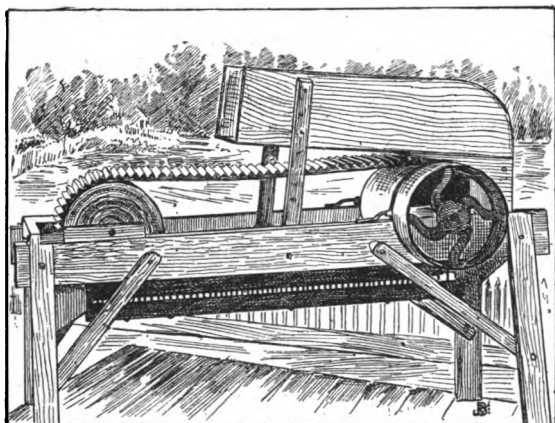


FIG. 21.

the frame are adjustable laterally upon the cross beams, and from the under side of each side beam projects a pedestal with an attached spud axle, upon which the drive wheels revolve. A post extends downwardly from a bracket on the under side of each side beam, through a staple and eye formed on a plate attached to the forward end of the mold-board, each post being stayed by a brace bar, and the eyes and staples being large enough to move freely upon the post. For the vertical adjustment of the mold-boards, a link connects the staples on the forward end of the mold-board, each post being stayed by a brace bar, and the eyes and staples

being large enough to move freely upon the post. For the vertical adjustment of the mold-boards, a link connects the

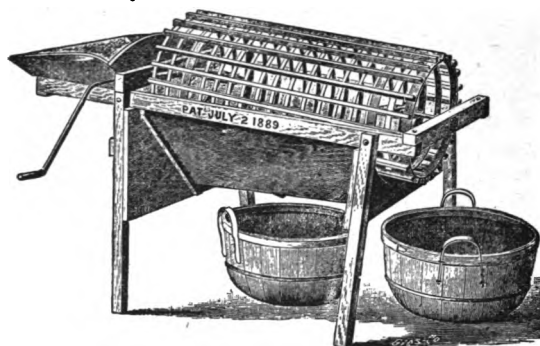


FIG. 22.

staple on the forward end of each with the forward end of a lever, fulcrumed upon an upright of the frame, a rack secured to one of the side beams being provided for each lever, which extends

to within easy reach of the driver. A stirrup is bolted up on the outer face of each mold-board at its rear end, a chain from each stirrup passing over a friction pulley, journaled at the upper end of a rack secured to the center cross beam, to attachment with a lever pivoted on the forward cross beam, and extending to the

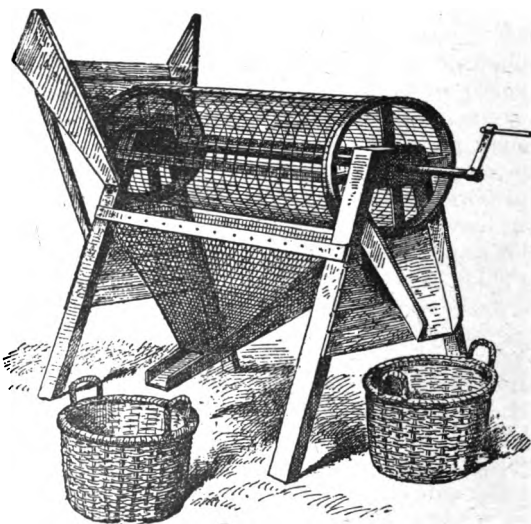


FIG. 23.

driver. The mold-boards are so hung that they are quite a distance apart at their forward ends, and nearer together at the rear, where the two boards are connected by a spiral spring, which spring is attached through short, adjustable

arms, whereby the spring may be lengthened, when it is desired to only half hill the rows. The driver, by resting his

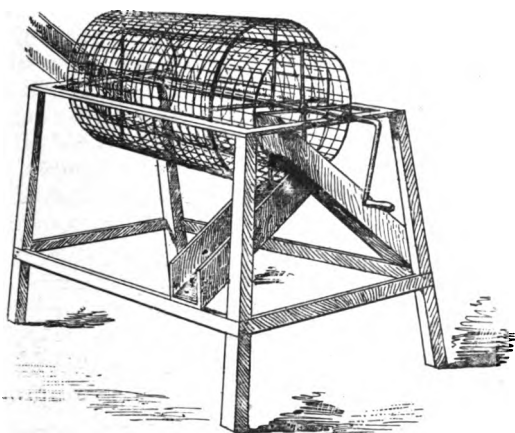


FIG. 24.

feet in the stirrups of the mold-boards, can adapt them to any crookedness of the rows or irregularities of the surface, the machine being adjustable to rows from three to five feet apart, and from six inches to two and a-half feet in height."—*Scientific American*.

CANE CUTTER.—(Fig. 26.) "It is made from the point of an old cradle scythe, united to a hard-wood handle about three feet long, with a leather loop tacked on six inches from the end."—*American Garden*, 244.

PLANT PEG.—(Fig. 27.) A wire peg used in England for holding down layers and vines.—*American Garden*, 247.

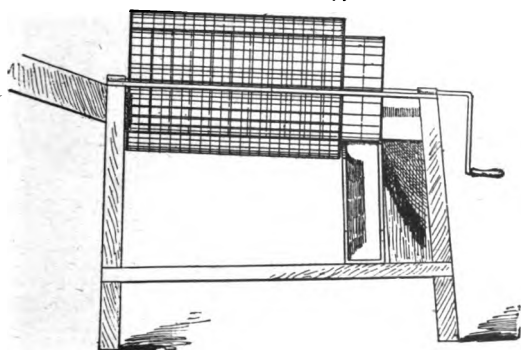


FIG. 25.

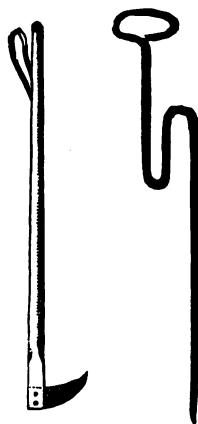


FIG. 26 FIG. 27.

WIRE STRETCHER.—(Figs. 28 and 29.) This has two advantages: It can easily be made from heavy wire; and it can be used at any time without cutting the wire, and applied anywhere along the wire to be stretched. Notches are filed near the ends of the wire after it has been stretched.
—*W.*, in *Der Praktische Ratgeber im Obst und Gartenbau*, 702.

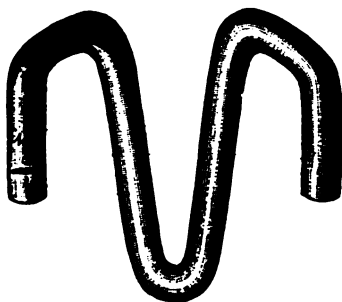


FIG. 28.

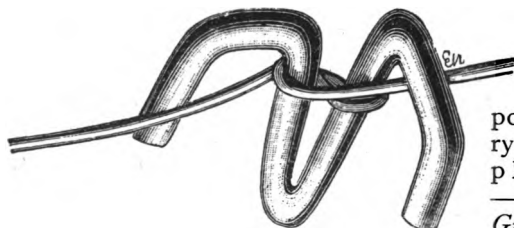


FIG. 29.

FLOWER-POT HANGER.—(Fig. 32, page 263.) "Constructed of three wires of equal length, each extending one-third around the pot with its bottom end twisted to the next wire, forming an outwardly extending arm; then all bent upward, their top ends joined and twisted into a hook.—*John Lane, Popular Gardening*, v. 84.

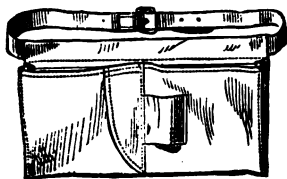


FIG. 30.

POT HOLDER FOR TRELLIS.—(Figs. 33 and 34, page 263.) Fig. 33 shows an iron holder, which is slipped onto a wall trellis, as shown in Fig. 34.—*Revue Horticole*, 353.

GARDEN BAG.—(Fig. 30.) An English leather bag for carrying tools, seeds, labels, etc.—*Popular Gardening*, v. 258.

GARDENING APRON.—(Fig. 31.) An apron containing pockets for carrying tools and plants.

—*Sister Gracious in American Garden*, 249.



FIG. 31.

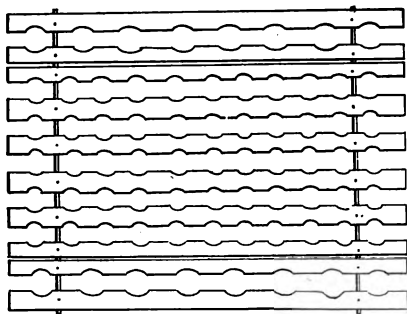


FIG. 35.

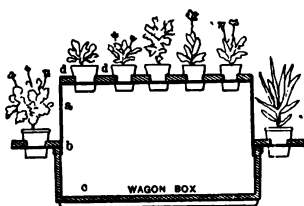


FIG. 36.

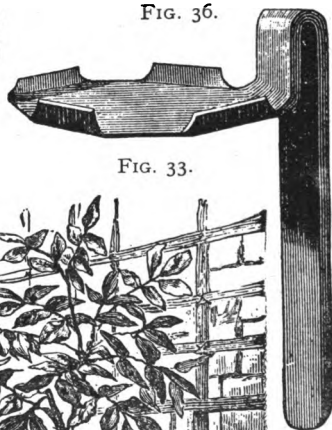


FIG. 33.

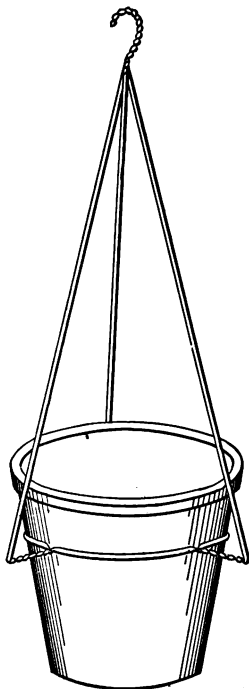


FIG. 32.



FIG. 34.

POT CARRIER.—Figs. 35 and 36, page 263). This is a rack, Fig. 35, made of thin, light slats with ratches for pots, which sets upon the top of a wagon box, as seen in Fig. 36. In order to bring the pots above whatever load may be in the wagon box, a strong iron frame is made to carry the slats, as shown by the dark line *b, a, d*, in Fig. 36.—L. B.



FIG. 37.

PIERCE, in *Popular Gardening*, v. 204.

OETZMANN'S FLOWER POTS.—(Fig. 37.) This English device (patented) consists of ornamented flower pots, so made that any number of them can be joined solidly together, and they will fit into the curves or angles of windows in chain-like fashion.—*Gardeners' Chronicle*, May 24, 1862.

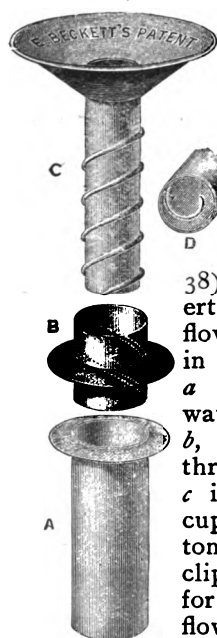


FIG. 38.

CHRYSANTHEMUM CUP AND TUBE.—(Fig. 38)—This device, the invention of Edwin Beckett, Elstree, England, furnishes a stand for cut-flowers which supplies water and is adjustable in height. Tube *a* contains the water, and the cap *b*, containing a thread, fits on it. *c* is the flower cup, in the bottom of which is a clip, shown at *d*, for holding the flower. This tube *c*, screws down into the water to the extent desired.—*Journal of Horticulture*, 378.

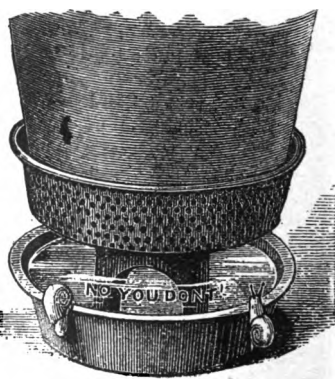


FIG. 39.

NEW FRUIT CAR.—A California fruit car, made by the Earl Fruit Company, is designed for the shipment of fresh fruits and vegetables through several degrees of latitude. It is so arranged as to be thrown into either a refrigerator or ventilator car.

TOOPE'S POT STAND.—(Fig. 39, page 264.)—A device for keeping snails and other in-

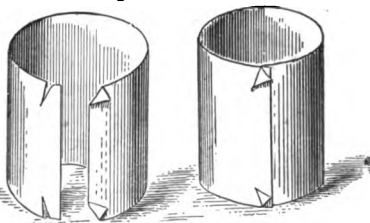


FIG. 40.

truders away from pots.—*Gardeners' Chronicle*, April 12, 460.

UTILIZING TIN CANS.—(Fig. 40.)—Tin fruit cans are burned until they fall to pieces, when the cylindrical portion is treated as in the figure, by means of strong shears, so that the edges can be clasped to-

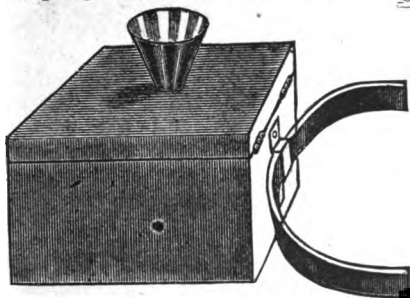


FIG. 41.

gether. They make useful substitutes for pots.—S. H. TAYLOR, in *Popular Gardening*, vi, 49.

BERRY-BOX HOLDER.—(Fig. 41.) This is a tin box, large enough to hold a quart berry box. The berries are dropped through the funnel. A strap passes around the picker's body, and gives him the use of both hands; and the box cannot be tipped over, and the berries are not dropped or spilled.—*Orange Judd Farmer*.

IMPROVED WATERING POT.—(Figs. 42, 43.) Ordinary watering pots are apt to drizzle when

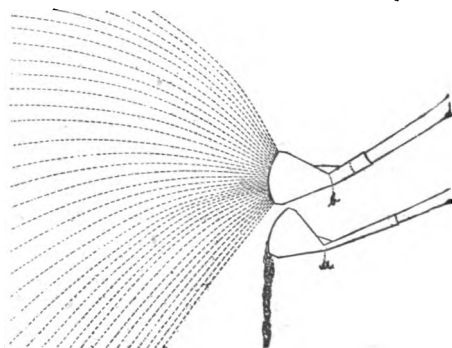


FIG. 42.

A. H.—19

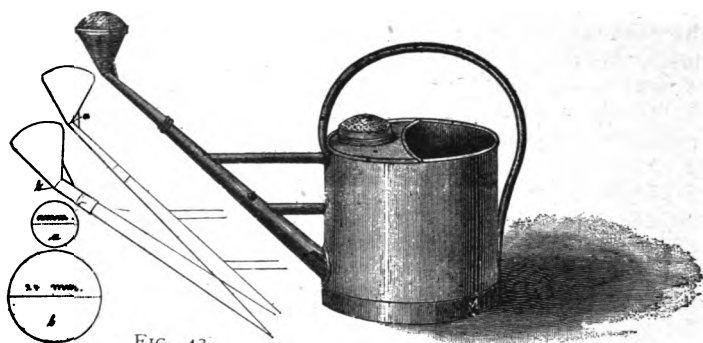


FIG. 43.



FIG. 44.

the water is nearly exhausted, as shown in the lower illustration in Fig. 42. To remedy this difficulty, the neck of the spout, *a*, should be made larger, as shown at *b*. The cross section of the neck should be twice greater than it commonly is, as represented by the circles in Fig. 43.—*Der Praktischer Ratgeber im Obst-und Gartenbau*, 229.

INDESTRUCTIBLE LABEL. (Figs. 44, 45.)—The tag is made of ordinary glazed earthenware, the name being sunken and colored blue. Heavy copper wire bent into spirals is used for fastening the tag to a plant.—R. ZORN, in *Der Praktischer Ratgeber im Obst-und Gartenbau*, 3.

ZINC LABEL.—(Fig. 46, page 268.) A zinc label, fastened to the tree or stake by driving into it the ends of a stiff wire loop.—ISAAC HICKS, in *Rural New-Yorker*, 266.

DOUBLE WOODEN LABEL.—(Figs. 47, 48, page 268.) It consists of two

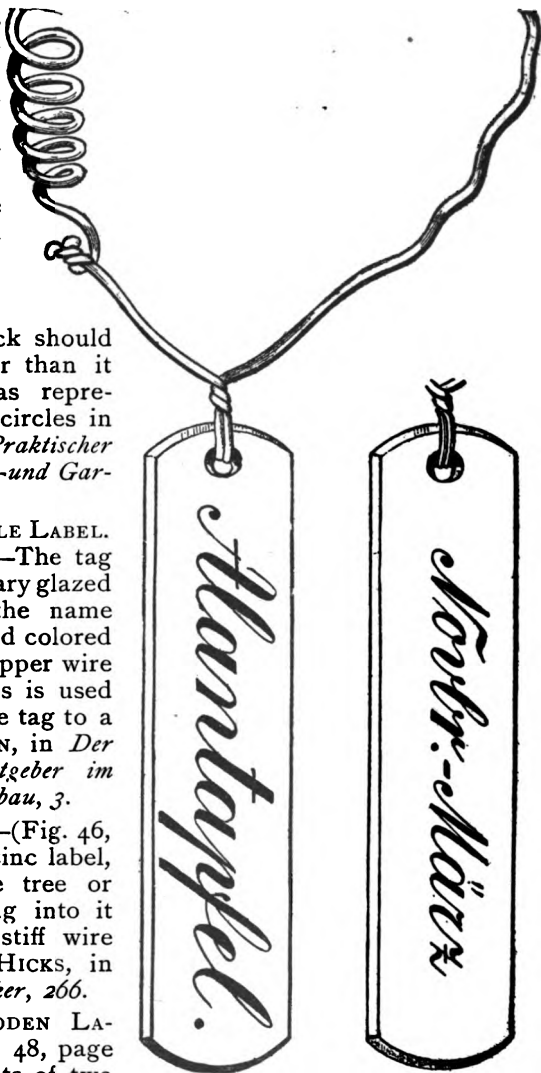


FIG 45.

ordinary wooden labels, fastened together by a wire. The

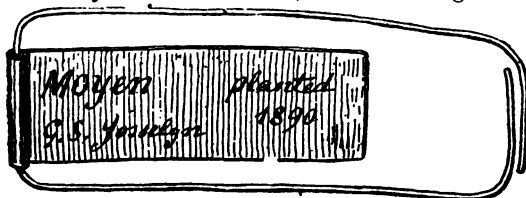


FIG. 46.

name is written upon the outside of the double label, as in any label, but it is also written on the inside for permanence. When the outside writing is

worn off, the label is opened and the inside writing will be found to be bright. The label is fastened to the tree by a tack, Fig. 48.—

F. S., in *Rural New-Yorker*, 215.

SEED PROTECTOR.—(Fig. 49.) A box a foot square, with a wire cloth bot-

tom, for setting over papers and pans of drying seeds, to protect from wind and vermin.—L. H. BAILEY, in *American Garden*, 89.

APPARATUS FOR TESTING THE VITALITY OF SEEDS.—(Figs. 50, 51, page 269.) This consists of three parts: a tin tank (c) for

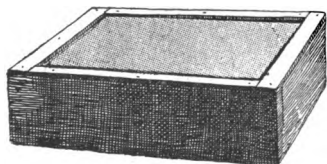


FIG. 49.

holding water; a block of gypsum

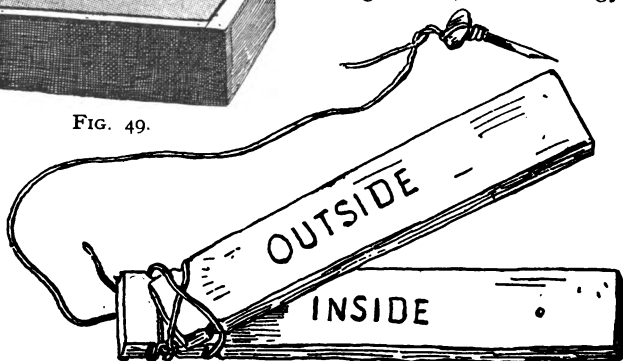


FIG. 48

(*b*) which contains several compartments for the reception of seeds, and which draws up the water and keeps the seeds moist; a glass cover (*a*). When the seeds have been placed

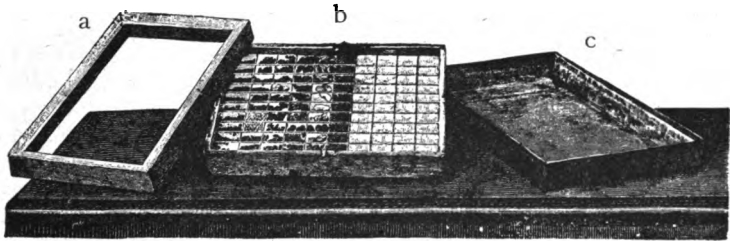


FIG. 50.

in the compartments of the block of gypsum, the latter is placed in the pan containing the water. The glass cover is fitted to the block.—R. BETTEU, in *Der Praktischer Ratgeber im Obst-und Gartenbau*, 229.

GRAPE BAGS.—(Figs. 52, 53, 54.) The three illustrations show a convenient method of preparing and applying common paper bags to grapes.—*Rural New-Yorker*, 414.

POLLINATING BAG.—(Fig. 55, page 270.) Grocer's manilla bags (the $\frac{1}{4}$ -lb. bag is most serviceable) are prepared by running a soft string through two of the edges, about an inch from the open end, and the string is tied at one of the edges to keep it from falling out. The bags are dipped into water an instant

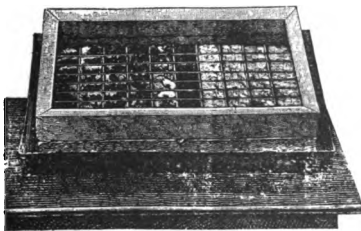


FIG. 51.

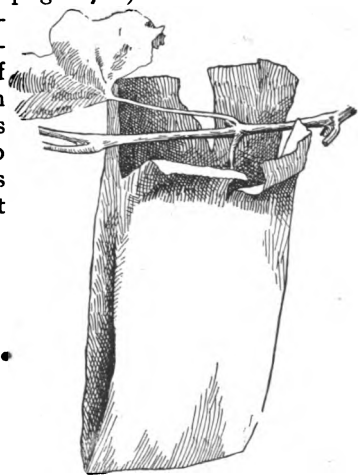


FIG. 52.

before they are used, to make them soft enough to tie snugly about the stem of the flower.—

L. H. BAILEY, in *American Garden*, 89.

POLLINATING KIT.—(Figs. 56, 57, page 271.) A tin box 9 x 12 inches and 3 inches deep, with compartments for materials. Along the front of the box is a compartment for pencils, pincers and brushes, one for scissors and one for a lens. In the upper left hand corner is a place for bags, and adjoining it is a compartment (shown divided in the cut by mistake) for labels. Across the right end is a narrow compartment for string, and a corner for a bottle of alcohol. The note book is kept behind a guard on the cover.

—L. H. BAILEY, in *American Garden*, 88.



FIG. 53.

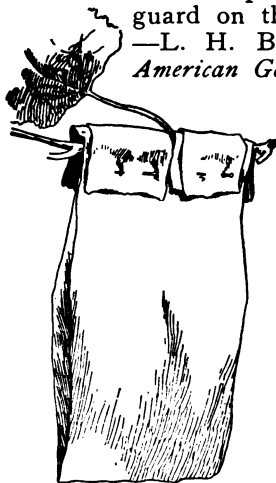


FIG. 54.

RELIABLE SEED CASE.—(Figs. 58, 59, page 271.) Fig. 58 shows a tin box 9 in. long, 7½ in. wide and 5 inches deep. "The cover slides back. There is a little rim or elevation on the front end of this cover, made by turning up the tin, which serves two or three good purposes. This rim strikes the top of the pigeon-hole when the box is shoved in, causing the box to close tightly. It also prevents the

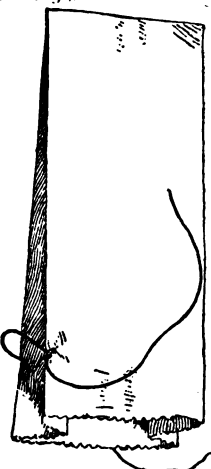


FIG. 55.

It also prevents the

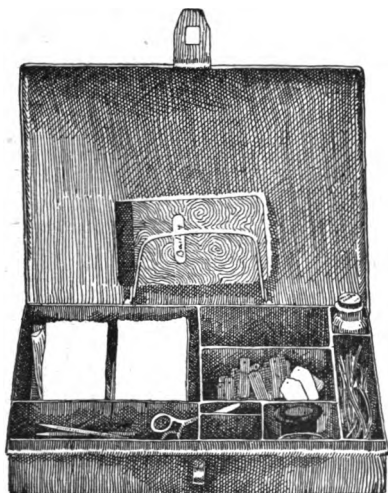


FIG. 57.

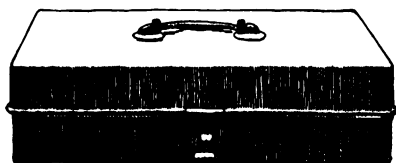


FIG. 56.

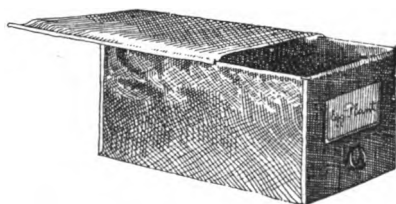


FIG. 58.



FIG. 59.

box from going in too far, in case the pigeon-hole is too deep. Then, when the box is shut and shoved in, the thumb is pressed against this rim while the box is drawn out, so that

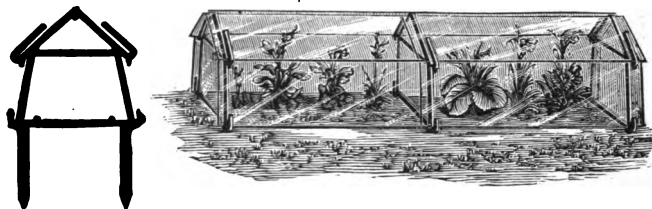


FIG. 60.

the box is self-opening and self-closing. The boxes are placed loosely in a pigeon-hole case, shown in Fig. 59, and may be taken out entirely, if occasion requires. On the front of the box is a form into which a label is dropped."—L. H. BAILEY, in *American Garden*, 89.

PLANT PROTECTOR.—(Fig. 60.) An English device consisting of an iron form, so made that it

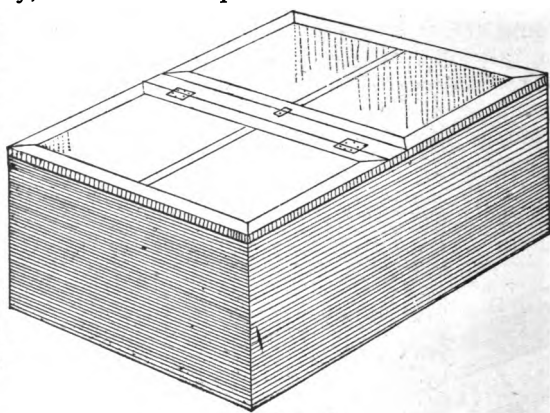


FIG. 61.

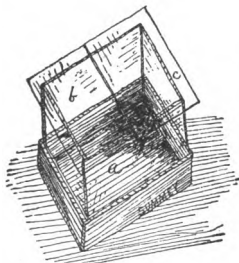


FIG. 62.

will hold panes of glass for protecting tender plants.—*Popular Gardening*, v. 132.

PROPAGATING BOX.—(Fig. 61.) A bottomless box about four feet long by three feet wide and two feet deep, covered with two sashes, one of which raises upon a hinge. This is set upon the greenhouse bench.—FRED W. CARD, in *American Garden*, 307.

PROPAGATING BOX.—(Fig. 62, page 272.) “A box, *a*, 3 or 4 inches high is taken, and for use in the house a water-tight lining (painted tin or galvanized iron) is filled inside; and between this lining and the sides and ends, enough space is left to allow glass, *b*, to be inserted and held firmly in place. The glass should come about 10 in. above the box.” The box is filled with

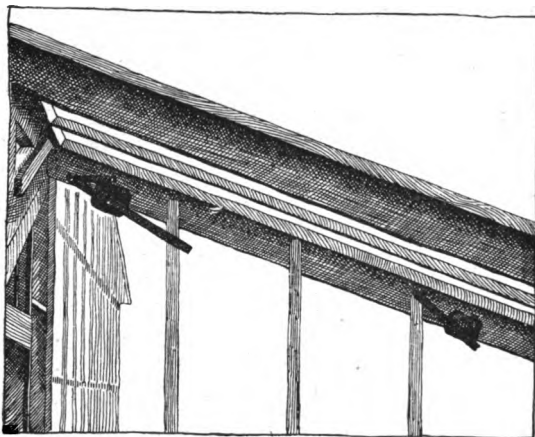


FIG. 63.

sand, and may be set upon the back of the kitchen stove or on greenhouse pipes.—HORTUS, in *American Garden*, 540, 541.

A CHEAP VENTILATOR.—(Figs. 63, 64.) “This is a modification and improvement of an old device. It is useful for raising the whole sash in low and cool houses. Fig. 63 shows

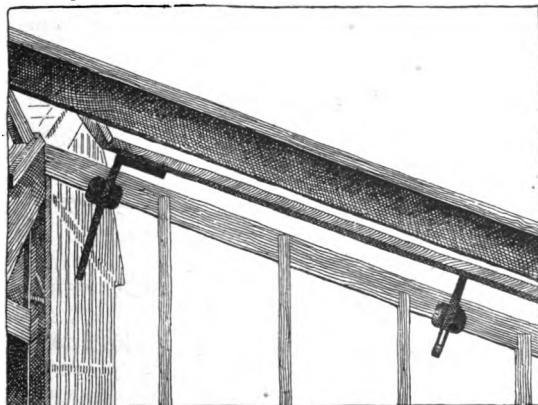


FIG. 64.

the fixtures in place upon one side of the sash only. The upper lever has a joint, the top portion being 6 in. long, while the lower portion is about 16 in. The lower lever has a slot 3 or 4 in. long, to allow the sash to slide. When the up-

per levers are pulled down, the sash is carried downwards until the top of the lower portion of the lever strikes the sash, when any further pulling of the levers must raise the whole sash, as shown in Fig. 64. The first downward movement of the sash allows the top of the sash to lie under a cap, to prevent leaking."—L. H. BAILEY, in *American Garden*, 89.

AUTOMATIC RAIN-WATER SWITCH.—(Fig. 65.) *A* is the conductor from the roof, and it terminates in the switch *D*. *B* is the pipe leading to the cistern, and *C* is a flaring receiver constructed to receive one end of the switch, *D*, when it is tilted in that direction. *E* is a barrel for receiving the first water from the roof. *F* is a float, connected with the switch and raising it by rod *G*.—*Pop. Gar*, v. 96.

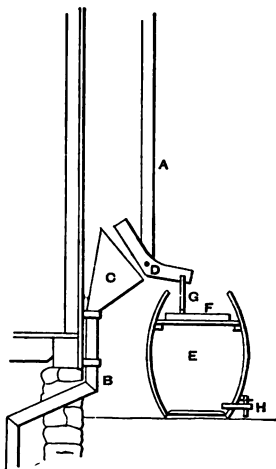


FIG. 65.

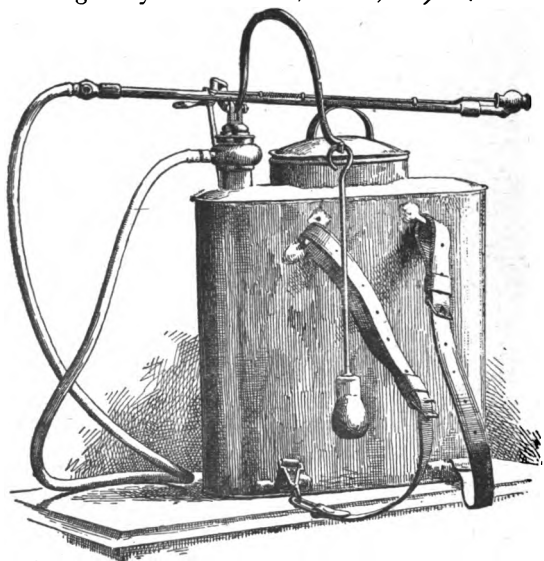


FIG. 66.

KNAPSACK PUMPS.—Several knapsack pumps have been introduced during the year, all of which proceed upon the same principles. The Galloway pump (Fig. 66) perhaps combines more merits than any other. The lance nozzle, which is also shown in the figure, is an invention of note (see

pages 81, 105). Mr. Galloway has also applied paper indurated fibre, such as is used in the manufacture of pails and



FIG. 67.

SPRAYING DEVICE.—(Fig. 67.) This is a device to which a hose, 5, is attached, and the force of the water drives the liquid insecticide through the rose at the opposite end. 2, 2 are stop-cocks. The receptacle, 3, holds two or three quarts, and the insecticide is put in at 4. —MR. WHITING, in *American Florist*, v. 368.

TORCH FOR DESTROYING INSECTS.—(Figs. 68, 69.) It consists of a small tank which contains the oil, and a tube for holding the wick. The tank is pointed at both ends, to allow of its easy passage among branches; and the tube is bent so that all parts of the tree may be reached. —JOS. STEBEL, in *Der Praktische Ratgeber im Obst-und Gartenbau*, 827.

ADJUSTABLE NOZZLES.—Two adjustable nozzles for spraying bushes and trees, made upon a new principle, are



FIG. 70.

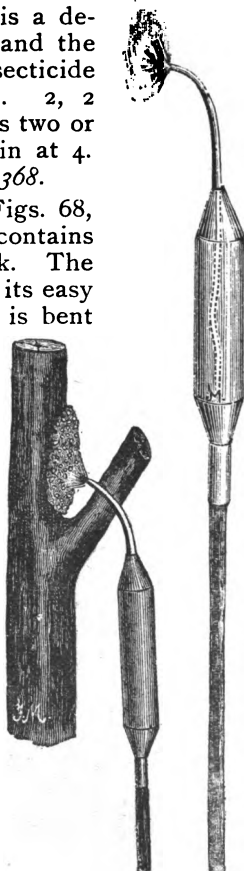


FIG. 69. FIG. 68.

described and figured in Bulletin 18, Cornell University Experiment Station, 40, 41. They proceed upon the principle of compressing the end of a rubber tube.

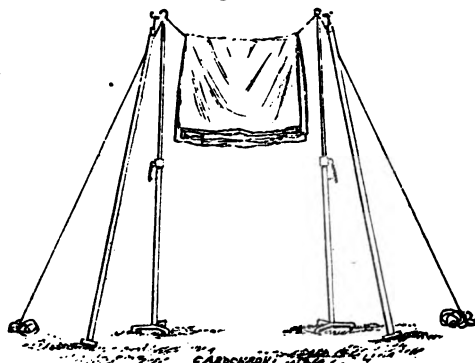


FIG. 71.

noxious gases. Fig. 70 (p. 275) shows the method of lighting and using it in houses. Fig. 71. is a movable screen or cover for trees out of doors, and it is being put in position in Fig. 73. When in

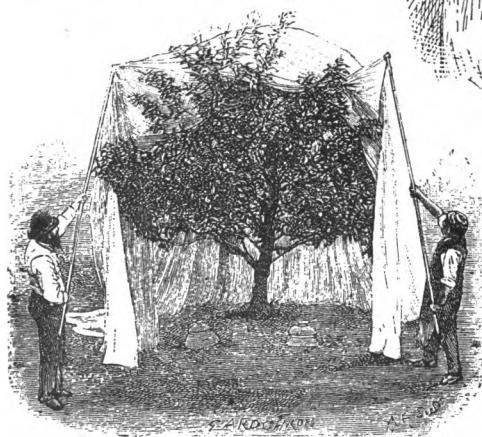


FIG. 72.

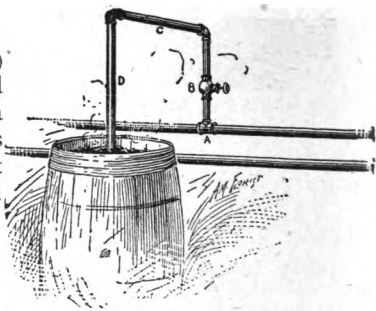


FIG. 73.

position, a tobacco sheet is burned under it. — *Gardeners' Chronicle*, Nov. 8, 537.

FUMIGATOR—(Fig. 73). A barrel is filled with tobacco stems, and steam from a steam pipe, A, is conducted into it. By turning the

valve *B*, a quick and neat fumigation is secured.—A. H. LANGE, in *American Florist*, v. 336.

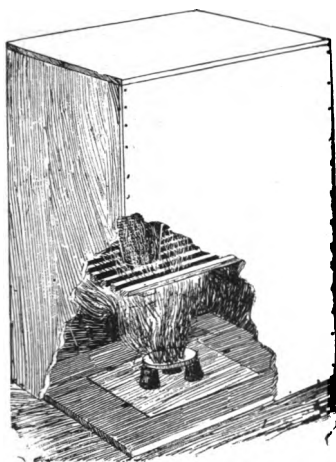


FIG. 74.

SPRAYING OUTFIT.—Bulletin 18, Cornell University Experiment Station, describes and figures a convenient wheel-barrow tank for use in spraying bushes and other small plants.

FUMIGATING BOX.—(Fig. 74.) “There is a piece of zinc in the bottom of the box, to prevent its taking fire from dropping of coals. On this set three flower pots, and on these the pan containing the leaves [of tobacco]. The pan should have a hole in it the size of an egg, to give sufficient draught so that the leaves will be all consumed.” A shelf above the fumes holds the plants

to be treated.—*American Agriculturist*, 74.

GOPHER TRAP.—(Fig. 75) A spring trap, set in the bottom of a gopher's hole, and which is readily understood by

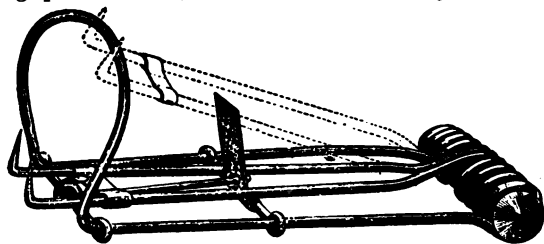


FIG. 75.

reference to the cut.—F. L. WASHBURN, in *Rural New-Yorker*, 437.

SULPHUR GUN.—(FIG. 76, page 278) “Made of two pieces of stove-pipe, the one fitting outside of the other, and working up and down over the other piece, the latter being held firmly with its pointed end in the hole, by one hand grasping the

long handle, while with the other hand one pumps the fumes down the burrow. *B* represents a perforated disk fitting into a smaller pipe, and held in place near the lower or conical end, *A*. It is on this plate that one places pieces of old woolen rags, which are set on fire. Upon this burning mass is poured powdered sulphur.—F. L. WASHBURN, *Rural New-Yorker*, 486.

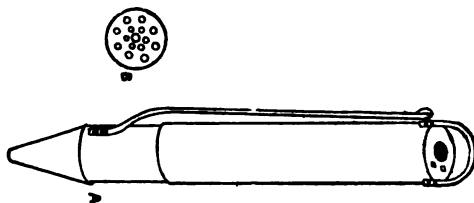


FIG. 76.

§ 11. *NECROLOGY OF 1890.*



PETER HENDERSON.

Peter Henderson, so widely known as a seedsman, gardener and florist, died at his home on Arlington Avenue, Jersey City, on Friday, January 17th. Although he had been suffering from an attack of the prevailing influenza, his illness was not regarded as serious until it turned to pneumonia. On Thursday evening the symptoms became alarming, and within twelve hours from that time he died. He was born in 1823 in the Scotch village of Pathhead, near Edinburgh. His father was the land steward of a gentleman in the neighborhood. His early education was obtained in the parish school, where he was successful in obtaining a number

of prizes. He was always a close observer and had the faculty of turning his observations to good advantage. He early became interested in botany and the arts associated with it, and before he was eighteen years of age had twice obtained the medals offered by the Botanical Society of Edinburgh for the best herbarium. At sixteen he was apprenticed to a gardener, and before he came to this country at the age of twenty, he had already written for some of the English horticultural publications. In 1843, with little capital excepting pluck, industry and a strong constitution, he came to this country, and entered the employ of George Thorburn, Astoria, Long Island. He also worked with the late Robert Buist, and Charles Spang of Pittsburgh. By frugality he accumulated a small capital, and in 1847 he began business as a market gardener in Jersey City. He worked hard and was successful, and for upwards of twenty years this was his principal business. He began the cultivation of ornamental plants, and the business became so great that market gardening was gradually given up. A little later he became a seedsman, and this soon proved the most important part of his business; at the time of his death he was accounted the most successful and widely known seedsman in the country. In 1865 the firm of Henderson & Fleming began business as seedsmen in Nassau street, and afterward it was moved to the present location in Cortlandt, with the firm name so familiar to all gardeners. He was probably the most widely read on matters pertaining to his business of any writer of his time. His contributions were always welcome to any horticultural publication and his books among the best selling published. He always retained an affection for his countrymen and gardeners in general, assisting many of them in different ways. He was a busy man, but even those nearest him say they could hardly understand how he accomplished so much. He was indefatigable in his efforts to extend his business, his sagacity was rarely at fault, and his activity and observation were ceaseless. His kindly nature and uniform courtesy endeared him to those who met him, even casually, and have been the inspiration of many a young florist. Having a strong constitution by nature, he rarely suffered from ill health, a circumstance which he himself attributed to his practice of spending some hours in the open air each day, working about his

grounds or superintending others. Although careful, he was liberal, and many benefitted by his kindness. He leaves a widow, two sons and two daughters.—*American Garden*, Feb. 1890, 113.

The following sketch of Peter Henderson is adapted from a eulogy read before the New York Florists' Club by A. D. Cowan :

'Born of respectable and industrious parents in the little village of Pathhead, in Midlothian, Scotland, where he received the first rudiments of his education, we find young Henderson at the age of 14 on his way to Edinburgh to fill his first situation, which he held for the next two years. One of the great ambitions of a youth on leaving a provincial school is to obtain a situation in the Scotch capital, and this is given as an explanation of his having started out in life in the employment of an inn-keeper, this being the only position available at the time. In after life he never regretted this early experience, which was to some extent instrumental in shaping his future destiny, and he was always proud of having left the business as uncontaminated as when he entered it. Throughout his entire life he was an earnest and devoted friend of the temperance cause, and we know that many workmen by taking his advice own their own homesteads to-day. His subsequent four years' apprenticeship, served in the gardens of Melville Castle, one of the most noted country seats in Scotland, made him a proficient gardener, and having by this time acquired a botanical and mathematical education, he had thus become possessed of the groundwork of his career. It was during this period that the attention of botanists was drawn to the young student by his successful competition for the medal offered by the Edinburgh Royal Botanical Society for the best herbarium of native and exotic plants. At the age of 20 he landed on these shores, and it is not strange that an honestly earned reputation preceded him. His services were immediately sought after, and for the next five years he was employed by two of our leading nurserymen, and also in laying out the grounds, planning and supervising the erection of greenhouses for a prominent resident of Pittsburgh.

"We have now reached the period when the young gardener's reputation for fidelity, industry, and ability was attracting wide attention; but he wisely concluded at this time to change his occupation to the commercial production of vegetables and flowers, and with the capital which he had accumulated (\$500), he bought the stock and appliances of a florist and market gardener's business in the vicinity of Jersey City. This was Peter Henderson's first venture, his establishment consisting of three small greenhouses, six cold-frames, and twelve acres for raising vegetables for market. No additions were made to his plant until 1854, when he built another greenhouse; and he afterwards kept adding to his area of glass until, in 1865, it had reached a total of 13 houses. * * * * In 1866 *Gardening for Profit* appeared, and perhaps to that work more than to any other cause may be ascribed the rapid advance of American vegetable gardening. Peter Henderson at this time was engaged in an occupation which required 16 hours of attention a day, most of the work involving manual labor, but

during the short noon intervals and night hours, when his body required rest as did his mind, he wrote *Gardening for Profit*, lying on his back on the floor with a pillow under his head. Under these circumstances, knowing from living witnesses that he wrote every word of that book, and dictated to an amanuensis the works that followed, I cannot avoid referring at this moment to the reprehensible action of obscure individuals, who under anonymous protection, being unfortunately accorded access to some of our horticultural papers, are trying to cast a doubt upon the genuineness of the author's personal accomplishments. They merely show to the world their jealous rivalry, and their ignorance of the intellectual powers he possessed. To Peter Henderson will belong for generations to come the credit of popularizing, improving and developing gardening in the United States.

"One of the most beautiful traits in his character was his humility. In his public performance, he was entirely destitute of anything like vanity or self-complacency; and in his private conduct he was remarkably unassuming and retiring. He was never jealous of anyone's success, and always seemed pleased to know of the advancement of a competitor. In truth, Peter Henderson was among the most humble of men, and when his great talents and achievements are contemplated, his manly virtues, his modesty and humility appear pre-eminently conspicuous, and will tend to enhance the estimation in which he was held by his fellow citizens. Briefly as I have referred to these fine qualities, we all know that their source could only be found in a benevolent heart."

Peter Henderson's work and writings have exercised a profound influence upon American horticulture, particularly upon vegetable gardening. *Gardening for Profit* marks an epoch in market gardening in this country. Nearly 250,000 copies of this work have been sold. This was written in one hundred hours, it is said, while the author was closely pressed by many duties; and to this fact is probably to be ascribed its directness and conciseness. Its influence lay in its simplicity and timeliness. In 1868 *Practical Floriculture* appeared, and in 1875 *Gardening for Pleasure* was written. The *Hand Book of Plants* was published in 1881, *Garden and Farm Topics* and *How the Farm Pays*, in 1884. Mr. Henderson's contributions to the agricultural press were also considerable. No American writer has written so much to so good purpose upon the common practices of commercial horticulture.

The influence of his business successes has been felt far and wide among the horticultural trades, and few men, if any, have done so much to simplify and improve the methods of handling plants for commercial purposes. His personal influence was strong and abiding. A fuller account of his life and work has been published in a pamphlet of forty-eight pages by his son, Alfred Henderson.

The portrait on page 279 is a faithful copy of a photograph which is commended by Peter Henderson & Co. as the best one to be had.



CHARLES GIBB.

Charles Gibb, whose name is familiar to all who grow fruits in the cold north because of his work upon Russian and other hardy fruits, died in Egypt in March of *la grippe*, while on his way home from a horticultural trip to China and Japan. The following biographical sketch is written by John Craig, of the Experimental Farm at Ottawa. The above portrait is made from the best photograph of him.

The subject of this sketch was born at Montreal, on the 29th of June, 1845, and died at Cairo, Egypt, March 8th, 1890. His father was a notary by profession who amassed a fortune in Montreal, dying in 1857. The son's early education began at the high school of that city, going from there to the grammar

school at Lennoxville, P. Quebec. He entered Bishop's college, Lennoxville, but on the completion of the first year took up work at McGill university, Montreal, where he graduated in 1865, taking the degree of Bachelor of Arts. On account of overwork at college his health was much impaired and eyesight weakened. After consulting eminent American skill, he went to Europe and placed himself in the hands of the famous oculist Von Graeffe, who recommended a walking tour. Accordingly he set out, accompanied by an old college chum. In this trip they covered Switzerland, Germany, Holland, Norway and Sweden, which improved his health very much. In the winter of 1867-8 he accompanied his uncle, Mr. I. J. Gibb, of Como, P. Quebec, to the East, visiting Constantinople, afterwards extending the journey up the Nile as far as the first cataract; from here going on to Palestine and then to Corfu, returning by Venice and Rome.

In 1869 he went to Mercersburg, Pa. and bought a peach orchard; coming back to Montreal in 1870, he brought with him the first canned fruit exhibited in the country (one jar of which is still in the possession of Mr. I. J. Gibb, Como, P. Quebec). His interest in fruit culture was now fully awakened and he began to look around for a permanent location for a fruit farm, which he found at Abbotsford, P. Quebec, where he established himself in 1873. From that time till the date of his death he was an active, independent worker in horticulture, and being possessed of moderate means, he was enabled to devote his time and money fully to experimental work. His travels were extensive, and included tours of Manitoba and northwest territories, British Columbia, the southern and western states and the West Indies.

But probably the one of greatest importance, and with which his name will always be connected, was that to Russia in company with Professor J. L. Budd in 1882. This trip was undertaken entirely at his own expense and without any encouragement from the Provincial government of Quebec. The results of this journey—a most arduous and costly one—are well known to the horticultural public. Importations of trees, scions and seeds followed, and were distributed among the local societies of the Province and to the system of Dominion Experimental Farms just then being inaugurated. In 1886 he went over the same ground again, verifying the work of his

former trip and making such additional importations as in his added experience he thought advisable. He also, on this journey, made a study of the fruits of Norway, Denmark, Sweden and the adjacent islands. In July, 1889, he left Abbotsford on what proved to be his last journey. His route was across the continent to British Columbia, taking steamer from that point to Yokohama. It was his intention to make a study of the fruits of northern China, Japan and India. In this he succeeded, though laboring under many difficulties, it being the summer of the many floods in China, which made the mountain roads almost impassable. From China, Japan and India he sent home numerous packages containing seeds and scions of plants which interested him as being useful and ornamental. It was on reaching Cairo, Egypt—thus completing a tour of the world, having visited this point via England in 1867,—that he was attacked by *la grippe*, which developed into double pneumonia resulting in death on the 8th of March, after an illness of six days. Writing to friends at home on the 6th, two days before his death, he says: "I had hoped to have seen you all again, but am ill and do not expect to see Canada again. We do not like to do things this way." It certainly was hard, after accomplishing his self imposed task, to die thus with his face turned toward home.

He was an active worker in a number of horticultural societies. The Montreal Horticultural Society owes its present prosperous condition to his untiring energy and executive ability. Through his instrumentality several county associations were organized which have aided largely in the dissemination of horticultural knowledge and the furthering of fruit interests. As a member of the Council of Agriculture for Province of Quebec, he assisted in obtaining grants of money which were of prime importance to the early welfare of these societies. His generous nature was fully exemplified by constant donations in a quiet unostentatious way to various charitable and public institutions. The Redpath Museum of McGill college is indebted to him for many interesting acquisitions from Florida, West Indies, China and Japan.

On his farm, at Abbotsford, he had collected, undoubtedly, the best collection of hardy fruits, trees and ornamental shrubs in Canada. This estate is now in the hands of Wm. Craig, for twenty years his farm manager.

Though cut off in the full vigor of manhood, his life work apparently only fairly begun, he has left many evidences of the careful and painstaking manner by which his horticultural work was characterized. The following is a list of his most important publications, the principal of which have been published in the reports of the Montreal Horticultural Society: "Ornamental and Timber Trees not Natives of the Province of Quebec," being a comprehensive list of those species of possible value to Canadian planters; "Report on Russian Fruits," a plain unvarnished tale giving descriptions and first impressions of the Russian apples and their value; "Hasty Notes on the Trees and Shrubs of Northern Europe," a concise descriptive list of the hardiest East European trees and shrubs; "Russian Apples Imported by the Department of Agriculture, Washington, in 1870," a laborious work of translating and comparing Russian opinions with the experience of American growers; "Nomenclature of the Russian Apples," a work undertaken at the instance of the American Pomological Society, of "Translating and Rendering into Euphonious English Unpronounceable Russian Names, also Throwing out Synonyms;" "Fruits for the Cold North," compiled after personal visits to the principal fruit growing districts of the northwestern states, contains a brief description of the varieties best adapted to northern latitudes. In addition to the above, we have from his pen many interesting papers, mostly descriptive of new and little known fruits and plants of foreign countries. The Bishop of Quebec writes of him: "He was one of my first boys at Lennoxville, and I have always had a most affectionate remembrance of him. Mr. Williams and I enjoyed beyond description a visit of a few days to him at Abbotsford, but indeed all my remembrances of him were colored by the atmosphere of his kindly and genial nature. He had, too, a force of character which is something far higher than good nature, and which, directed as it was to the improvement of our fruit culture, made him a public benefactor, and I was proud of him."

Professor J. L. Budd, of Ames, Iowa, writes: "The one thing that struck me most forcibly in my long and close relations with him was his modesty of character. He contributed \$500 towards my expenses (Russian trip), yet he at first conveyed the impression that the sum was furnished by the friends

of horticulture in Quebec, and when he found that I knew it to be a private donation, he positively refused to permit me to make it public. In his relations with me and the public, he wished to do the greatest possible good, *sub-rosa*. There literally was no selfishness in his composition, so far as I was ever able to discover."

Mr. Gibb, though physically far from robust, by strictly temperate habits and being of an active, energetic and persevering temperament, accomplished vastly more in the same space than many gifted by nature with greater strength. His most prominent characteristic was extreme modesty, ever shrinking from public eulogy of his own work. His deeds of charity will make his name long remembered. As a public speaker he did not excel, but as a conversationalist his manner and expression of thought were charming. As a man of sterling integrity and a public benefactor his name will linger long in the memory of the Canadian people whom he loved.

PATRICK BARRY.

The death of Patrick Barry, June 23, of the firm of Ellwanger & Barry of Rochester, New York, removed the most commanding figure in recent American horticulture. He was a man of strong personality, clear perception and great integrity, and his opinion always exerted wide influence. He was one of the greatest and best known nurserymen of the century. He entered the nursery business when American horticulture was young, and when there was need of a commanding personality to extend and popularize it. Along with the Downings, Prince, Parsons and others, he was a pioneer. He helped to build up a great business which is not only a commanding financial success but a stimulus to all to grow fruits and ornamental plants. He did much to give standing and stability to the nursery business throughout the country.

Mr. Barry was also well-known as a horticultural writer. In his early years his pen was prolific, especially in an editorial way. He was once editor of the famous *Horticulturist*, and later he was horticultural editor of the *Genesee Farmer*. In his later years he became widely known among pomologists from his work on the fruit catalogue of the American Pomological Society. This was work in a new field. But his most

important literary work is the *Fruit Garden*, which first appeared many years ago, and which in its revised edition is one of our best and most popular books upon fruit culture. All his work was strong and inspiring. His memory will long remain a great inspiration to horticulturists.

For more than thirty years and until his death, Mr. Barry was president of the Western New York Horticultural Society; he was also president of the New York Agricultural Society, and one of the board of control of the State Agricultural Experiment Station; president of the Rochester City & Brighton Railroad Co., of the Flour City National Bank, Mechanics Savings Bank, Rochester Gas Co. and Powers Hotel Co.

The following tribute is from John Hall, secretary of the Western New York Horticultural Society, of which Mr. Barry was so long president. It first appeared in *The American Garden* for August:

It is impossible to do full justice to the life and work of Mr. Barry. He was born in Ireland, near the city of Belfast, in 1816. After receiving a liberal education, he emigrated to this country at the age of twenty years. Entering the employ of the Princes, of Flushing, Long Island, as a clerk, he devoted his time and energies to his chosen occupation, and in the remarkably short space of four years had acquired a very thorough knowledge of the nursery business as it then existed.

In 1840 he moved to Rochester, N. Y., where he formed a partnership with George Ellwanger. The young firm started business with seven acres of land, known as the Mount Hope nurseries, and now of world-wide reputation. The young horticulturists of to-day find themselves the possessors of an inheritance secured to them through the privations and vexations of years of patient and persistent effort by the firm with which the late Mr. Barry was identified.

In those early days these pioneers found themselves in a new country, possessing no collections of fruit, with no telegraphic or cable facilities, with no railroads or fast ocean steamers, and separated from the Old World by a distance which then required almost as many weeks to traverse as days now suffice. Necessarily, therefore, many weeks and months were spent in the effort to procure new stocks, both in Germany and France, which, when gathered, were transported to the sea-ports by stage coach, and thence conveyed by sailing vessels to the New World. When the young firm started to budding trees they were sneered at, and called fools and lunatics for their pains. Such were some of the difficulties encountered by these men in the efforts to introduce new stocks into this country. But they persevered, and Mr. Barry was identified with the growth of horticulture to the present time, having succeeded in giving to the American people the most desirable plants that can be successfully grown upon its soil. Every new apple and pear was imported from abroad and tested, in order to determine its quality



PATRICK BARRY.

and adaptability to the climate before it was placed upon the market. It is safe to say that no other nursery firm in the country pursued such a course; nor, indeed, is it now so necessary, since the United States government and individual states, as well as some colleges, have established experiment stations for the purpose of continuing just such work as the firm of Ellwanger & Barry inaugurated forty years ago.

Mr. Barry occupied numerous positions of prominence and trust in the state and in the "flour city," and was identified with many enterprises which have helped to make Rochester the prosperous city it now is. For more than thirty years he was the president, and a most liberal patron of the Western New York Horticultural Society, and in his last communication to that body, at its annual meeting in January last, he thus expressed himself: "And now a word as to the presidency. You have given me this post of honor for a very long period of years; I am no longer able to perform its duties, and lay it down with profound gratitude, and with an affectionate regard for the society and every individual member." But the assembled horticulturists with one voice declared that so long as Patrick Barry was able to write "yours truly," so long he should be continued as their president.

In an editorial, a Rochester paper thus referred to Mr. Barry: "He was a man of exceptionally strong character. The slightest contact with him elicited some manifestation of personal power. He was straightforward in his methods, honorable in his purposes, and of an integrity that would not tolerate even the suspicion of indiscretion. In private and public affairs he was a stern, aggressive personality whose influence went always for what was honest, genuine, and true; and in his loss the community loses not simply an individual life but a moral force." And the bishop of the church with which Mr. Barry worshipped, as he stood by his casket, thus beautifully made reference to the dead horticulturist: "This man and the others associated with him raised the occupation to which they devoted their life work to the dignity of a liberal profession, not manual or clerical, but a profession that needed long years of study and careful application. By intellectual labor and by extensive reading, he contributed to make their profession worthy to be called one of the liberal professions—raising those who were engaged in it above their fellow men;" and again, "he ruled in his household wisely, conscientiously, lovingly, as a man should rule in it."

Such was Patrick Barry, a man to whom every lover of horticulture owes a debt of gratitude that can best be acknowledged by constant efforts to perpetuate his example.

He leaves a widow, one daughter and three sons.

The portrait on page 289 is commended by W. C. Barry as a good likeness of his late father.



GEORGE THURBER.

Dr. Thurber, long known to all lovers of rural life as one of our most genial writers, died in April. The following sketch of him was prepared by Dr. Byron D. Halsted, of Rutgers College, who knew him long and intimately. The portrait is a faithful interpretation of the most characteristic photograph extant.

GEORGE THURBER, A. M., M. D., a brief sketch of whose life and labors is herewith recorded, was born in Providence, R. I., on September 2, 1821, and died at his home near Passaic, N. J., on April 2 of the present year, and was, therefore, in the 69th year of his age. In ancestral lines he was of Scotch descent. As a boy he possessed a special fondness for natural history, and after enjoying a partial course in the Union Classical and Engineering School of Providence, he became interested in pharmacy and served an apprenticeship as an apothecary, at the end of which period he engaged in that business for himself and was soon a master of the history and derivation of every drug in his store. During this time he became enthusiastic in chemistry and botany in addition to his strictly pharmaceutical studies. His appointment soon after, as lecturer upon chemistry at the Franklin Society of his native city, is sufficient evidence of the early progress in sciences of the rising apothecary. A copy of Turner's chemistry in the possession of his relatives shows that it was a present to him by his class in 1840, or when he was only nineteen years of age. While fond of the natural sciences in general, he found his greatest delight in botany, a branch of science congenial with his occupation, and particularly adapted

to his comprehensive mind. At a very early age his love for collecting and classifying plants grew to be an absorbing passion, and he soon took a high rank among American botanists and became, while yet a young man, closely associated with Drs. Torrey, Gray and Englemann, and others of that noble order of scientists. These well-sustained relations opened up a new career for Mr. Thurber, for in 1850 his desire for exploration was realized by an appointment to the position of botanist, to which were added those of quartermaster and commissary, upon the United States and Mexican boundary survey under Commissioner J. R. Bartlett. During four years he was actively engaged in exploration along the boundary of the United States from the Gulf of Mexico to the Pacific ocean. Much of the territory passed over was unknown to science, and with his strong love for plants, it is needless to say that Thurber made valuable contributions to American botany. In Commissioner Bartlett's own words, "He was indefatigable in his exertions to make thorough examinations and complete collections of everything belonging to his department." Many of the more important of Thurber's discoveries in botany formed the basis of the historic contribution by Dr. Gray, namely: "*Plantæ Novæ Thurbereanæ*," published in 1854. At that time the honor of a new genus was conferred upon the discoverer in a plant of the mallow family, *Thurberia thespesioides*, which Thurber found in Sonora. Later it was determined that this genus was included in *Gossypium*, and Mr. Bentham afterwards, in the journal of the Linnean Society, xix. 58, dedicated another genus to Thurber, comprising grasses of our southwestern country of which the *Thurberia Arkansana* (Bentham), figured in the recent work "*Grasses of the Southwest*," by Dr. Vasey, is a member. The exceeding appropriateness of this choice of a generic name will be fully appreciated in the light of further facts connected with Thurber's extensive and critical work done upon American grasses, to be mentioned later.

During the boundary survey Thurber, among his many interesting discoveries, found a species of pilostyles, a small parasite upon the shoots of leguminous plants, and consisting mostly of buds and flowers developing directly from the bark of the host. Drs. Torrey and Gray could scarcely believe the truthfulness of Thurber's remarkable discovery and determination, but became fully convinced after a full investigation of the curious subject.

The honorary and well-merited degree of Master of Arts was conferred upon Thurber by Brown University upon his return to Providence at the close of the boundary commission. Soon after, largely because Dr. Torrey was its chief, he accepted a position in the United States assay office in New York, for which his previous knowledge of chemistry was able to fit him without further preparation, which indicates the thoroughness of Thurber's early study and the retentiveness of his remarkable memory. In 1856 the position was resigned on account of political differences, and we have in this a characteristic illustration of the honesty and sincerity of Thurber's whole nature. When asked for a contribution to the campaign fund of the party in power, a usual thing in such places, Thurber, strongly in sympathy with the abolition movement and a supporter of Frémont, inquired if it was an invitation or a demand, and upon learning it was of the latter class, at once tendered his resignation. In no one was there ever a keener sense of justice, and his strict adherence to duty often cost him hardships which he bore as a martyr. Almost at once he became lecturer upon botany and

materia medica in the College of Pharmacy of the city of New York, and also established connection with the Cooper Union as lecturer upon botany and allied subjects, while at the same time prosecuting his study of the Mexican boundary collection of plants, the results of which were published in the Smithsonian Contributions to Knowledge.

The degree of Doctor of Medicine was conferred upon him in 1859 by the New York Medical College, and in the same year Dr. Thurber accepted the professorship of botany and horticulture in the Michigan Agricultural College, a position which he filled with great credit to the institution and himself until his resignation in 1863, when he assumed the editorship of the *American Agriculturist*, which honorable and difficult position he held with singular success for twenty-two years, when he was forced by failing health to relinquish the active control of the journal, while still contributing to its columns and aiding substantially in its management by his wide experience and wise counsel.

While Dr. Thurber has done a vast amount of solid work as explorer, lecturer, professor and scientist, it was as editor that he performed the greatest work for the American people. An editor who is well able to judge has said; "His writings were characterized always by sound common sense, based on exact knowledge of many subjects, and they did more, in his time, to elevate the standing of the agricultural and horticultural press of the country than the writings of any other man."

Soon after assuming his editorial labors, and in order that they might be the more complete and effective, he established himself upon a few acres in a retired place near Passaic, N. J., which he styled "The Pines," after a small grove of stately trees located near his house. Here, with a sister and brother-in-law, Mr. George C. Woolson, and their two children, very dear to him, he spent the last years of his life. While he did not usually write under his own name, he was well and favorably known as the author of the "Notes from the Pines," in which he shared with the public the pleasure he took in his extensive ornamental grounds and experimental gardens. The careful use of his test grounds furnished the foundation facts for much that he wrote, and accounts, in part, for the remarkable accuracy that characterized all his contributions. For extent and accuracy, these papers are conspicuous in horticulture for the botanical information that was contained in them. A second series of papers was the "Doctor's Talks," which he contributed for years without interruption. And with his rare faculty of clear explanation, these columns for the boys and girls were models of their kind and read with profit by old as well as young. Thousands of now grown up men and women will long hold in grateful remembrance the name of "The Doctor," over which title appeared from month to month much solid science in the garb of clear, charming diction. He possessed a remarkable fondness for children, seemed to fully appreciate their needs, and loved to instruct them in a thousand useful ways. This is perhaps all the more remarkable as he never married, and best of all, never grew old.

Dr. Thurber revised and in part re-wrote Darlington's "Agricultural Botany," which was subsequently published under the title of "American Weeds and Useful Plants," and still remains the standard work upon the subjects treated therein. In his strictly botanical work, much of which had a strong practical bias, Dr. Thurber had a particular fondness for the grasses, and he early conceived the design of preparing a book upon this great family of

plants as represented in America. While editorial duties and failing health prevented the accomplishment of this great task for which he was so well prepared, he was able to do much for his beloved science. For example, he contributed all the botanical papers in the Appleton's New American Cyclopedia, a work the usefulness of which can only be known by those who saw how much of botanical error and untruth were published in the original edition. He was the author of nearly a hundred pages upon the graminæ in the "Botany of California."

There is a vast amount of substantial scientific work that cannot be outlined here, for it was done in connection with his oversight of the publication of hundreds of rural books upon a wide range of subjects by the firm with which he was so long associated—The Orange Judd Company.

In 1880 Dr. Thurber, accompanied by his lifelong friend, Dr. M. Miles, spent a few months in Europe, where he met many of his former correspondents and friends in the botanical and horticultural world. Nearly all the letters of condolence from these friends across the ocean contain complimentary words of Thurber's important visit to their countries. It was his wish to travel, but his heavy frame and rheumatic limbs made long jaunts painful to him, and, therefore, he was almost always at home and at work.

He was a life member and vice president of the American Pomological Society, and presided at the Atlanta meeting. To the botanists of his own city he was best known as the long-time president of the Torrey Botanical Club, the immediate successor of his old friend and botanical adviser for whom the club is named, Dr. John Torrey. He was president of the New Jersey Horticultural Society, member of both the New York and the Philadelphia Academy of Sciences, and various other societies.

As a worker, Dr. Thurber was indefatigable and rested only when he could work no longer. He knew neither day nor night so long as his strength lasted. "Not infrequently would his labors continue through the night, the hours uncounted, until the family rising perhaps late Sunday morning, would find him still engaged at his writing, the rays of his lamp mingling unnoticed with those of the sun." During the last years of his life it was a custom to have his couch by the side of his table, where he would work to exhaustion and then retire until strength was gained sufficient to resume his task.

As an editor, Dr. Thurber always held broad and liberal views of every important question that bore upon the best interests of his constituents. His contempt for anything that favored of sham was unbounded, while his praise of worthy objects and honest men was equally generous. As the writer of the "Humbug columns," he made his journal the terror of swindlers and charlatans, and largely because of his straightforward, truthful and convincing exposures in well-chosen words that cut like a knife. Although frequently tempted by alluring offers, he would not grant an unscrupulous advertiser space in his journal. In short, his abhorrence of quackery and adulteration was such that even in the smallest matters he took all possible precautions to discourage and condemn them. For example, he had his own little hand pepper-mill at table, and ground out upon the spot, frequently with words of commendation of the principle at stake, the condiment needed for his viands. His intense love for getting at the solid underlying facts of things sometimes almost made him uncomfortable. This is humorously illustrated in his not being able to enjoy his green peas

at dinner if he could not be assured of the name of the variety. Into everything, and particularly his editorial work, he carried this desire for exactness and bottom facts.

The following brief extracts from a large number of notices of our friend's life serve to emphasize the statements already made in this sketch. Beginning from across the ocean, Maxwell T. Masters, editor of *The Gardeners' Chronicle*, writes; "Thurber did excellent work as a botanist, whilst as editor he occupied a unique position and delighted and instructed thousands who knew nothing of his personality and were ignorant even of the Doctor's name."

The *American Agriculturist* records these words for its revered editor: "Few men, if any, have exerted so powerful an influence on progressive American agriculture as has Dr. Thurber."

In the *Torrey Bulletin* the following, among appropriate words by Dr. Rusby, may be found: "Graminology was his well-known specialty, and there were few, either in this country or abroad, who were his equals."

The leader in the *Garden and Forest* for April 9 opens as follows: "The death of Dr. Geo. Thurber ends the career of the most accomplished horticultural writer America has produced."

In person Dr. Thurber was remarkably conspicuous, while at the same time extremely modest and retiring. As a young man when starting out upon the Boundary Commission he was like an arrow in straightness, fully six feet in height, broad shouldered, fair in complexion and remarkably handsome. His face, as familiar to the writer in later life, was brim full of kindness and sunshine, and with his massive head and long flowing hair "The Doctor" was "the observed of all observers" wherever he might be. His conversation was animated and oftentimes brilliant, full of a mother's tenderness and pity for the unfortunate, and reeking with sarcasm for the pretender in any form. He suffered wrong in silence when he only was concerned, but would always champion the cause of the injured and oppressed. When he returned from Mexico on the Boundary Commission, he brought with him a youth of Chihauhua, who for some time attended school at Thurber's suggestion and expense. And so it was throughout his life. He was ever doing some kindness to others, often to his own inconvenience. His open heartedness prevailed at all times when there was any genuine call for sympathy. In short, genial and generous, great in knowledge, patient in work, keen of perception, kind hearted, frank and true, sound in judgment, with a most retentive memory, sensitive and sympathetic, considerate and courageous, such are some of the sterling qualities which combined to make up our revered scientific editor and friend. It is men of this stamp who make the world better while they live and long after, but sadden with a deep loss the lives of many when they pass away. To have the intimate friendship of such, is to dwell in the companionship of great souls.

Severe labors and accompanying exposure during the four years upon the frontier were largely responsible for the rheumatism to which Dr. Thurber was a victim for many years. This and overwork paved the way for more serious troubles that nearly incapacitated him for labor during his last few years, and entailed much pain and suffering from which death only could relieve him.

He was buried in the Swan Point cemetery, overlooking a beautiful valley, near Providence, R. I., where in early life he first began a career of botanizing that reached across the continent, and the results around the world.

PETER KIEFFER.

Peter Kieffer, the originator of the Kieffer pear, died at Roxborough, Philadelphia, November 7th. He was born in Alsace in 1812, and came to America in 1834. The following account of him is from his friend, Thomas Meehan :

"Mr. Peter Kieffer was a near neighbor of mine. He was, when a young man, educated as a gardener, and I may say highly educated, much above the average class. He came to America from Alsace. He was of French descent. He was gardener for many years at Mount Airy to Mr. James Gowen, long known as President of the Pennsylvania State Agricultural Society, and kept up his connections with friends in the Old World, occasionally introducing rare plants and trees, many of which are still existing in Germantown. Being of a frugal and saving disposition, after some years he had means enough to purchase a few acres of ground near here, on which he established a nursery and market garden. Among his introductions was the Chinese Sand pear. His land here increased in value to such an extent that he sold it for a considerable advance, and with the proceeds bought a farm near Roxborough, about three miles from where I now live; on this ground he transplanted some of his Sand pears, planting them among some Bartlett pear trees. The branches of the Bartlett pears and the Chinese Sand pears intermixed. There was a great demand for Sand pear trees by the neighbors for ornamental gardening, on account of the delightful odor of the fruit, besides the thrifty, healthy growth of the foliage, and he raised seedlings from his trees in order to supply this demand. On one occasion he noticed among the seedlings one with somewhat different foliage than the rest; this he saved for himself, and when it bore fruit, the one which we now know as Kieffer pear was the result. It is, of course, only guessed at from this that the Kieffer pear is a hybrid between the Sand pear and the Bartlett. I mention this because some have contended that this is not a hybrid, but simply a sport, without any real intermixture of pollen from the Bartlett tree. Of course, we are all entitled to our opinion, and my opinion is, that it is really a hybrid. Mr. Kieffer was a very generous man, child-like and unsuspecting in his disposition, and, though he knew the great value of this fruit, he seldom resisted applications for grafts or cuttings, and though hundreds of thousands of dollars have been made by different parties by the sale and distribution of the Kieffer, it is probable that he never made many dollars out of it for himself. Mr. Kieffer's knowledge of gardening was of a very high order; he knew how to ripen pears, and it is a remarkable fact that no matter what the season or what the crop, Kieffer pears distributed by Mr. Kieffer were always of the highest excellence. I never knew a Kieffer pear to come from Mr. Kieffer that one would not say was of a higher character than almost any pear that he ever ate; but those who know no more of the art of gardening than to put in a tree, and let it mature of itself, without any help at all on the part of the grower, conclude that Kieffer pears are scarcely worth eating. Undoubtedly these pears are of no account in the way of excellence as we usually find them, but in Mr. Kieffer's hands this pear was something to remember with keen pleasure after having once eaten it.

"Peter Kieffer spelled his name as here written, and pronounced it as if written *Kifer*, the *e* in the first syllable being silent. Discussions are continually going on that he ought to have pronounced his name in a different manner, following the German rule, but Mr. Kieffer was not a German, but a Frenchman, and I suppose would be justified in judging for himself how his name should be pronounced."†

* * *

DR. C. C. PARRY, one of the most indefatigable of American botanical explorers and collectors, died at his home in Davenport, Iowa, February 20th, from pneumonia following influenza. He began his explorations in 1849 as one of David Dale Owen's party to survey Wisconsin. The next year he was with the Mexican boundary survey. From that time until his death his labors were unceasing, and he added greatly to the knowledge of western botany. Dr. Parry was born in England, in 1823.

* * *

SIDNEY WILKINSON, manager in the seed house of Henry A. Dreer, Philadelphia, died March 28th. He was born in Providence, R. I., in 1851.

* * *

CHARLES E. HITCHINGS, one of the firm of Hitchings & Co., manufacturers of greenhouse heaters and supplies, died December 31, 1889, at 37 years of age.

* * *

OSCAR K. KREINBERG died early in January, at his home in Philadelphia, of influenza. He was well known as a grower of out-door summer flowers.

* * * * *

R. C. AFFAURTIT, an editor of the Dutch journal *Sempervirens*, died Feb. 1st, at 65 years of age.

* * *

DR. RALPH AINSWORTH, formerly a member of the Council of the Manchester Royal Botanical Society, died aged 79 years. He was deeply interested in orchids, and *Dendrobium Ainsworthii* was raised in his collection.

† It is evident that the name should be pronounced *Keefer*, after the German method, for it is a German name. A true French pronunciation would be neither *Keefer* nor *Kifer*. In Alsace the name would ordinarily be pronounced with a long *e* even by Frenchmen.—L. H. B.



SHIRLEY HIBBERD.

SHIRLEY HIBBERD died at Kew, November 16th, aged 66 years. He was a well-known writer on horticultural subjects, having published many books, among the most important of which are *Bramble and Bay Leaves*, *Rustic Adornments*, *Fern Garden*, *The Ivy*, *Town Garden* and *Amateur's Rose Book*. At the time of his death he was editor of the *Gardeners' Magazine*. He had filled this position for thirty years and raised the magazine to its present state of excellence.

Mr. Hibberd was born at Stepney, England, in 1825. He was intended for a bookseller, but early turned his attention to literary work, in which he continued uninterruptedly until his death. He wrote upon a great variety of subjects, some of them historical. He was one of the most accomplished men who ever adorned horticultural professions, and his example must always remain an inspiration.

The above portrait of Mr. Hibberd is reproduced from the *Journal of Horticulture*.

**BENJAMIN S. WILLIAMS.**

BENJAMIN SAMUEL WILLIAMS died June 23, aged 68 years. He was born at Hoddesdon, England, and at the age of 14 entered the celebrated garden of John Warner, where his father was long employed as a gardener. At the age of 20 he entered the lists as an exhibitor, and soon acquired fame as a cultivator and exhibitor of the pansy. He next took up the ranunculus, and very soon launched out into floriculture of a comprehensive kind, accomplishing wonders with the aid of a few frames to enable him to grow flowers for exhibition in March and April. His ambition growing with his talent, he soon became an exhibitor of vegetables and fruits in the neighboring towns.

He soon felt the scarcity of books, and resolved that he

would do something to provide gardeners with truthful information in the department to which he was now giving special attention, and he became a careful note-taker, accumulating material towards the object in view.

In the year 1852, Messrs. Chapman & Hall published Mr. Williams first book, which was none other than his now famous "Orchid Growers' Manual." Other books followed on "Ferns and Lycopods," "Stove and Greenhouse Plants," and the "Orchid Album," all of them characterized by soundness of teaching, a generous breadth of view of every subject treated, convenience of arrangement, and all that is implied in the term "good book-making."

A considerable part of his labors has been bestowed in the formation and management of the Victoria and Paradise nurseries, first in Hornsey and later at Upper Holloway, where his son became his partner. Here orchids certainly take the lead, and the collection is, for the present, the best monument of the skill, taste and business energy of an honored veteran, whose like we may not for many years look upon again.—
Adapted from the Gardeners' Magazine.

The portrait of Mr. Williams is reproduced from *The Gardeners' Chronicle*.

* * *

JAMES BACKHOUSE, director of the York Nurseries, died in September, aged 65 years. He was one of the most prominent of English horticulturists.

* * *

W. H. BAXTER, formerly curator of the Oxford Botanic Gardens, died June 19, aged 74 years. He was associated with Mr. Loudon, and was a constant writer for horticultural papers.

* * *

HENRY BENNETT died at his home in Shepperton, England, August 12, from heart disease. He was one of the most successful and best known growers of seedling roses. He began life as a general farmer, but finding it somewhat unprofitable, undertook rose culture. Among his most famous roses are Her Majesty, Mrs. John Laing, Princess Beatrice, Grace Darling, Viscountess Folkstone, Lady Mary Fitzwilliam, Earl of Pembroke, Cleopatra and Captain Hayward. He

visited this country in 1887 and attended the meeting of the Society of American Florists at Chicago, where he met with a warm reception.

* * *

THEODOR BERNHARDI, formerly director at the Botanic Gardens at Erfurt, died in the latter part of November, 1889, aged 80 years.

* * *

JOHN M. BRAIDWOOD, of the forest department, Naini Tal, India, died, aged 50 years.

* * *

ALPHONSE DU BREUIL, one of the most popular authors on arboriculture, died in May, aged 80 years. He held many important positions under the government, and in 1846 published *A Course in Arboriculture*. He also assisted Mr. Girardin in writing the *Course in Agriculture*, and was also connected with the *Revue Horticole*. In 1853 and following years, the French Minister of Agriculture employed him to travel over France for the purpose of giving instruction in the cultivation of fruit trees. His influence upon the horticulture of France was very great. He is known to English readers through the translation of the *Thomery System of Grape Culture* (New York), contained in his *Cours d'Arboriculture*, and William Wardle's translation (London), *Scientific and Profitable Culture of Fruit Trees*. Du Breuil was born at Rouen in 1811, in the botanic garden of which his father was head gardener.

* * *

D. BUEHLER, landscape gardener at Lausanne, died March 18, aged 79 years.

* * *

DR. ALEXANDER VON BUNGE died June 18th, aged 87 years. He was a Russian botanist of great note, and he did much to extend our knowledge of the plants of many remote regions.

* * *

W. CAUDMELL, F. R. H. S., died March 22, aged 67 years. He was well known as a grower of primroses and hardy garden flowers.

WILLIAM CHAPMAN died September 25, aged 76 years. He was commonly known as "Pear Chapman," from his success in raising and exhibiting hardy fruits.

* * *

DR. E. COSSON, a celebrated French botanist, died September 30, 1890, in his 70th year. Immediately after receiving his degree of doctor of medicine, he studied the plants around Paris, and published the *Flora of the Vicinity of Paris*, which has remained a classic treatise. He continually contributed articles to papers, and at different times published the results of his labors in Algiers and Tunis.

* * *

JULES COURTOIS, one of the most respected horticulturists of France, died December 25, 1889, at the age of 76 years. He was one of the most distinguished pupils of Mr. Hardy, gardener-in-chief at Luxemburg, and later he tried to spread the excellent principles received from his teacher. He zealously tried to introduce practical courses in fruit culture in the department of Eure-et-Loir; and at the same time he founded the Society of Horticulture and Viticulture of Eure-et-Loir, to which he afterwards bequeathed 25,000 francs.

* * *

ADOLF CREDNER died May 7, aged 39 years. He first became known through his winter flowers, which he exhibited in January, 1881, at Berlin. Later he became connected with L. Moller's *Deutscher Gartnerzeitung*, and finally with the firm of Haage & Schmidt.

* * *

GEORGE DEAL, of the firm John Weeks & Co., horticultural builders, Chelsea, died June 30, aged 56 years.

* * *

FRIEDERICH GEORG DONAT, gardener of Count Carl von Schoenburg-Forderglauchau, died March 17, at the Castle Wechselburg on the Mulde.

* * *

FRANCIS DUMUR died recently at Moscow, Russia, aged 76 years. He was for twenty-four years head gardener of Moscow.

JOSIAH GOODWIN died June 3, aged 70 years. He was formerly the editor of the *Journal of the Bath and West of England Agricultural Society* and of the *Journal of the Royal Agricultural Society*.

* * *

OCTAVE GRAVOT, chief of a section in the firm of Vilmorin, Andrieux & Co, died August 17th, in Paris.

* * *

MR. GRUN, university gardener at Strassburg, in Els, died February 16th, aged 40 years.

* * *

THOMAS HARRISON, SR., of the firm of Harrison & Sons, died at Leicester, England, aged 75 years.

* * *

ENOCH HARVEY died October 1st, aged 64 years. Mr. Harvey was senior member of the firm Harvey, Alsop, Stevens & Harvey. He was a devoted lover of herbaceous and alpine plants, and was for many years chairman of the Liverpool Horticultural Company. His loss will be deeply felt by orchid growers.

* * *

SERAPHIN VAN DEN HEEDÉ, commercial gardener at Lille, France, died, aged 79 years.

* * *

WILLIAM HOLMES, of London, died September 18th, aged 38 years. He was a prominent landscape gardener and contractor.

* * *

MR. HOULLETT, for a long time superintendent of the greenhouses in the Botanical Garden of Paris, died in his 75th year. The genus of orchids, *Houlletia*, was named in his honor.

* * *

WILLIAM HUMPHRIES, for twenty-six years head gardener at Wimpole Hall, died, aged 68 years.

* * *

HERMAN JAGER, the most popular German gardener and horticultural writer, died January 5th, aged 74 years.

Mr. Jager was born at Munchenbersdorf, Saxe-Weimar. He visited Switzerland, Italy, and particularly France, where he worked a long time. On his return home he was appointed inspector of the gardens of Eisenach, a position which he held till late in life. During his long career, he wrote numerous excellent works on horticulture, and assumed, in 1880, the direction of *Moller's Deutsche Gartnerzeitung*. He also directed the arrangement of many parks and gardens which revealed his wide experience and profound knowledge of horticulture; and at the same time he treated æsthetic questions with enthusiasm and great conviction.

* * *

J. JAMES, one of the most prominent English horticulturists, died August 8th.

* * *

DR. JANKA, keeper of the botanical department of the National Museum of Hungary, Buda Pesth, died recently, aged 55 years.

* * *

ALPHONSO KARR, well-known as the author of the popular work, "Voyage Autour de Mon Jardin," died September 30th, aged 82 years. Mr. Karr was born in Paris, in 1808. He early became a journalist, and assumed the editorship of *Figaro* in 1839. He was well known as a novelist.

* * *

STUART H. LOW, well-known as the head of the firm of Hugh Low & Co., of Upper Clapton, England, died April 22d, aged 63 years.

* * *

H. LUDOLPH, the Royal inspector of gardens at Karbsaul, near Kassel, died December 11th, 1889.

* * *

ANDREW MACKENZIE, an extensive writer on horticultural topics, and superintendent of the Corn Exchange, Edinburgh, died in 1890.

* * *

E. MAGGS, director of the improvements in the park of the Manor House, at Aylesbury, England, died February 23d.

JULES MONGES, for a long time president of the Horticultural Society of the Bouches-du-Rhone, died March 3d, at Marseilles, aged 64 years.

* * *

DR. CARL MULLER died at Stuttgart, November 28th, 1889, aged 70 years.

* * *

MAUD NAFTEL, R. W. S., well-known through her beautiful flower pieces, died February 18th.

* * *

JULIUS NIEPRASCHK, died October 14th. He was the director of the Royal Garden "Flora," at Cologne, and was well-known as an able horticulturist.

* * *

MARIANNE NORTH, well known from her wonderful paintings of plants and natural scenery, died August 30. Her works, some over 800 in number, occupy a building in the Royal Gardens, Kew. She was an extensive traveler, and an artist of rare ability. Her early years were spent in New England.

* * *

GOTTHELF WILHELM POSCHARSKY, court gardener at Dresden, Germany, died Sept. 7, aged 72 years. He was well known as a landscape gardener, and many honors were bestowed upon him as rewards for his valuable services.

* * *

THEODOR RAU, gardener at the castle in Gusow, died in the early part of the year, aged 33 years.

* * *

JOSEPH ROBINSON, formerly well known as a cultivator of verbenas, pelargoniums, fuchsias and chrysanthemums, died at Chelmsford, England, aged 79 years.

* * *

FRITZ SATTLER, of the firm of Sattler & Bethge, in Quedlinburg, died December 5, 1889.

* * *

E. SEIDEL, gardener to the Grand Duke at Arco, Tirol, died June 10, aged 52 years.

M. F. SENELAR, President of the Horticultural Society of Bouches-du-Rhone, died on the 17th of March.

* * *

JOHN SHAW, a landscape gardener of note in northern England, died in his 79th year, September 14.

* * *

HUGO STARK, director of the gardens of the Grand Duke of Mecklenburg, died at Neustrelitz.

* * *

JOHN STEWART, for twenty-five years secretary of the Royal Caledonian Horticultural Society, died at the age of 76 years.

* * *

ROBERT WALKER, botanist and amateur gardener, died March 21. He wrote a history of the Buchan (England) flora.

* * *

JOHN WEBSTER, head gardener of the Duke of Richmond, died in his 76th year.

* * *

ENOCH WHITE, nurseryman at Bournemouth, England, died, aged 59 years.

* * *

WILLIAM WILDSMITH, for twenty-five years gardener at Heckfield Place, Winchfield, England, died January 29. He was a man of great mental breadth and varied experience, and admirably adapted by his temper and extensive knowledge for aiding and improving the plans of his employer, the late Viscount Eversley.

In the course of his industrious career he won no less than a hundred and fifty prizes, many of them firsts, and a considerable portion for grapes, although he was such an all-around man that he might be expected in any department of an exhibition in which high-class English gardening might be represented.—*The Gardeners' Magazine*.

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